

10/744, 39U

=> FILE REG

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

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=> D HIS

FILE 'HCAPLUS' ENTERED ON 27 DEC 2007

L1 569 S SOHMA ?/AU
L2 7430 S IGUCHI ?/AU
L3 1151 S KANAOKA ?/AU
L4 4 S SAITAMA ?/AU
L5 10279 S MORIKAWA ?/AU
L6 336 S MITSUTA ?/AU
L7 0 S L1 AND L2 AND L3 AND L4 AND L5 AND L6
L8 5282 S KAJI ?/AU
L9 1 S L1 AND L2 AND L3 AND L8 AND L5 AND L6
SEL RN

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

L10 8 S E1-E8

FILE 'LREGISTRY' ENTERED ON 27 DEC 2007

L11 STR

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

L12 SCR 2043
L13 31 S L11 AND L12
L14 3 S L10 AND PMS/CI
L15 720 S L11 AND L12 FUL
SAV L15 WEI394/A

FILE 'HCA' ENTERED ON 27 DEC 2007

L16 72146 S FUEL?(2A) (CELL OR CELLS)
L17 329 S L15
L18 94 S L16 AND L17
L19 QUE CAT# OR CATALY?
L20 QUE ELECTROD## OR CATHOD## OR ANOD##
L21 11 S L18 AND L19
L22 16 S L18 AND L20
L23 6 S L21 AND L22

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

L24 1159 S 1478-61-1/CRN

L25 277 S 90-98-2/CRN
 L26 75 S L24 AND L25
 L27 55 S L26 AND S/ELS
 L28 48 S L26 AND (?SULFONIC? OR ?SULFONAT?) /CNS

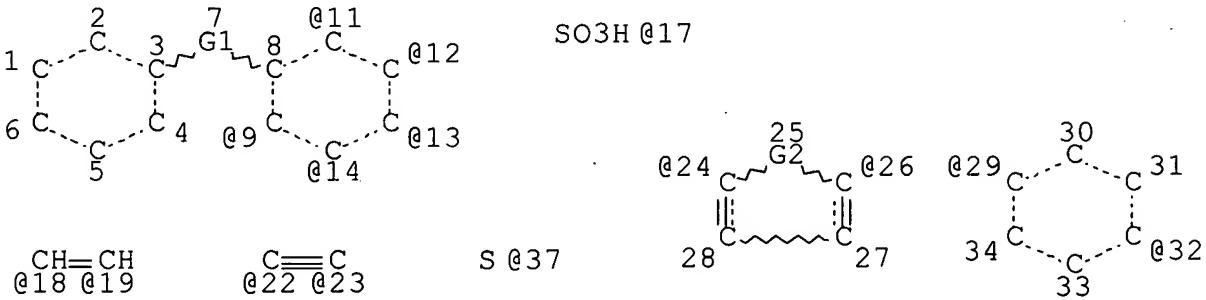
FILE 'HCA' ENTERED ON 27 DEC 2007

L29 89 S L28
 L30 72 S (L26/D OR L26/DP) (L) (?SULFONIC? OR ?SULFONAT?)
 L31 65 S L29 AND L16
 L32 40 S L30 AND L16
 L33 25 S (L31 OR L32) AND L19
 L34 39 S (L31 OR L32) AND L20
 L35 24 S L33 AND L34
 L36 4 S 1840-2002/PY, PRY, AY AND L35
 L37 76 S (L31 OR L32) NOT L36
 L38 6 S 1840-2002/PY, PRY, AY AND L37
 L39 15 S (L21 OR L22) NOT L23
 L40 73 S L18 NOT (L23 OR L39)
 L41 0 S 1840-2002/PY, PRY, AY AND L23
 L42 1 S 1840-2002/PY, PRY, AY AND L39
 L43 8 S 1840-2002/PY, PRY, AY AND L40

FILE 'REGISTRY' ENTERED ON 27 DEC 2007

=> D L15 QUE STAT

L11 STR



VAR G1=O/37/18-3 19-8/22-3 23-8/24-3 26-8/29-3 32-8

VAR G2=O/S

VPA 17-11/12/13/14/9 U

NODE ATTRIBUTES:

CONNECT IS E2 RC AT 37

DEFAULT MLEVEL IS ATOM

DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:

RSPEC I

NUMBER OF NODES IS 30

STEREO ATTRIBUTES: NONE

L12 SCR 2043

L15 720 SEA FILE=REGISTRY SSS FUL L11 AND L12

100.0% PROCESSED 2707 ITERATIONS

720 ANSWERS

SEARCH TIME: 00.00.01

=> FILE HCA

FILE 'HCA' ENTERED ON 27 DEC 2007

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(FORMULA 1)

=> D L42 1 BIB ABS HITSTR HITIND

L42 ANSWER 1 OF 1 HCA COPYRIGHT 2007 ACS on STN

AN 138:339060 HCA Full-text

TI Crosslinkable aromatic resins having protonic acid groups, and ion conductive polymer membranes, binders, and **fuel cells** made by using the same

IN Ishikawa, Junichi; Kuroki, Takashi; Fujiyama, Satoko; Omi, Takehiko; Nakata, Tomoyuki; Okawa, Yuichi; Miyazaki, Kazuhisa; Fujii, Shigeharu; Tamai, Shoji

PA Mitsui Chemicals, Inc., Japan

SO PCT Int. Appl., 132 pp.

CODEN: PIXXD2

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|------|----------|-----------------|------|
| | ----- | ---- | ----- | ----- | |
| | ----- | | | | |
| PI | WO 2003033566 | A1 | 20030424 | WO 2002-JP10536 | |

200210
10

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W: CA, CN, IN, JP, KR, US
RW: DE, FR, GB, IT, SE

TW 236486 B 20050721 TW 2002-91123279

200210
09

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CA 2463429 A1 20030424 CA 2002-2463429

200210
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EP 1457511 A1 20040915 EP 2002-775319

200210
10

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R: DE, FR, GB, IT, SE, SI, LT, LV, RO, MK, AL
CN 1630676 A 20050622 CN 2002-820224

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US 2004191602 A1 20040930 US 2004-820842

200404
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PRAI JP 2001-312799 A 20011010 <--
JP 2002-182252 A 20020621 <--
WO 2002-JP10536 W 20021010 <--

AB The invention relates to (A) a crosslinkable arom. resin which has crosslinking groups and protonic acid groups and is suitable for electrolyte membranes and binders for **fuel cells**, (B) polymeric electrolyte membranes and binders for **fuel cells**, made by using the resin, and (C) **fuel cells** made by using the membranes or the binders. The arom. resin has crosslinking groups which are not derived from protonic acid groups and are capable of causing crosslinking without the formation of a leaving component, and exhibits excellent ionic cond., heat resistance, water resistance, and adhesion, and low methanol permeability. It is preferable that the arom. resin bears as the crosslinking groups both C1-10 alkyl bonded directly to an arom. ring and carbonyl or carbon-carbon double or triple bonds, while preferred examples of the crosslinkable arom. resin include arom. polyether, arom. polyamide, arom. polyimide, arom. polyamide-imide, and arom. polyazole, each of which has crosslinking groups described above. Thus, 5,5'-carbonylbis(sodium 2-fluorobenzenesulfonate) obtained from 0.525 mol 4,4'-difluorobenzophenone and 210 mL 50% sulfuric acid 4.22, 4,4'-

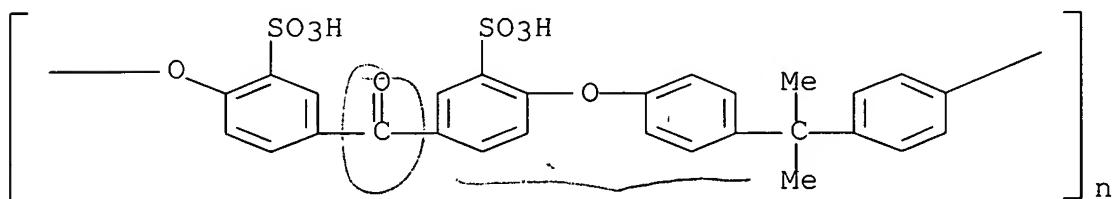
difluorobenzophenone 2.18, and 2,2-bis(3,5-dimethyl-4-hydroxyphenyl)propane 5.69 g were reacted at 160° for 4 h in the presence of potassium carbonate to give 10.39 g polyether ketone powder with reduced viscosity 0.85 dL/g, glass transition temp. 230°, and 5% wt. loss temp. 367°, which was applied on a glass and dried at 200° for 4 h to give a membrane with cond. 0.018 S/cm at 30° and 0.065 S/cm at 90°.

IT 342047-79-4DP, reaction products with ethenylphenol
515144-59-9P

(crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

RN 342047-79-4 HCA

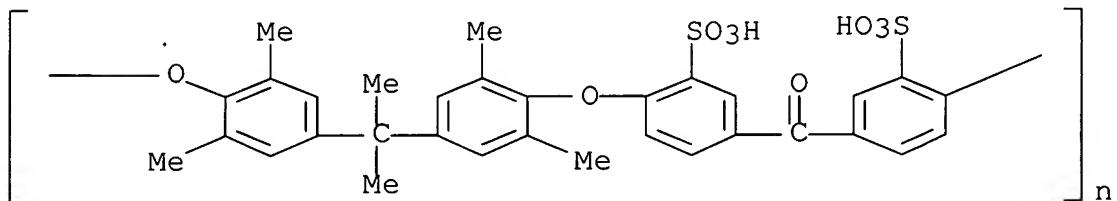
CN Poly[oxy(2-sulfo-1,4-phenylene)carbonyl(3-sulfo-1,4-phenylene)oxy-1,4-phenylene(1-methylethyldene)-1,4-phenylene sodium salt (1:2)] (CA INDEX NAME)



●2 Na

RN 515144-59-9 HCA

CN Poly[oxy(2,6-dimethyl-1,4-phenylene)(1-methylethyldene)(3,5-dimethyl-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)carbonyl(3-sulfo-1,4-phenylene) disodium salt] (9CI) (CA INDEX NAME)



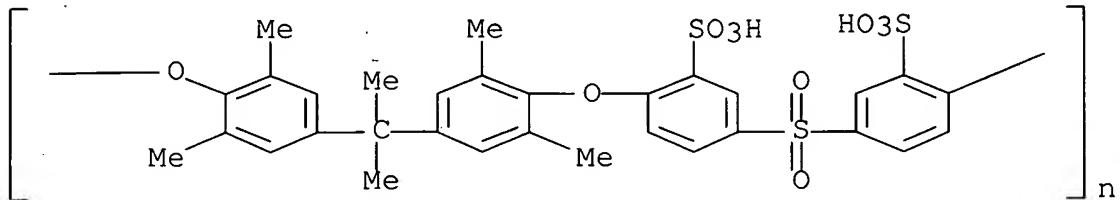
●2 Na

IT 515811-98-0P

(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

RN 515811-98-0 HCA

CN Poly[oxy(2,6-dimethyl-1,4-phenylene)(1-methylethylidene)(3,5-dimethyl-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)sulfonyl(3-sulfo-1,4-phenylene) disodium salt] (9CI) (CA INDEX NAME)



●2 Na

IC ICM C08G065-40

ICS C08G069-48; C08G073-10; C08J005-22; H01M008-02

CC 37-3 (Plastics Manufacture and Processing)

Section cross-reference(s): 38, 52

IT Polyamides, uses

Polyimides, uses

(arom., protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyimides, preparation

(blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Binders

(ion conductive; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Membranes, nonbiological

(ionic conductive; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyimides, uses

(polyamide-, arom., protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive

polymer membranes, binders, and **fuel cells**)

IT Polyimides, preparation
(polyamide-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyketones
(polyamide-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyketones
(polyamide-polyimide-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyimides, preparation
(polyamide-polyketone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyethers, preparation
(polybenzoxazole-, blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyketones
(polybenzoxazole-, sodium sulfonated, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polybenzoxazoles
(polyether-, blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polysulfones, preparation
Polysulfones, preparation
(polyether-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyketones
(polyether-, optionally crosslinked, and blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polysulfides
(polyether-, polyketones-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polysulfones, preparation

(polyether-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polysulfones, preparation

(polyether-polyketone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyketones

(polyether-polysulfone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyamides; uses

(polyimide-, arom., protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyamides, preparation

Polyketones

Polysulfones, preparation

(polyimide-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polysulfones, preparation

(polyimide-polyketone-, blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyamides, preparation

(polyimide-polyketone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyketones

(polyimide-polysulfone-, blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyimides, preparation

(polyketone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyethers, preparation

(polyketone-, optionally crosslinked, and blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polybenzoxazoles

(polyketone-, sodium sulfonated, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion

conductive polymer membranes, binders, and **fuel cells**)

IT Polyamides, preparation

(polyketone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyimides, preparation

(polyketone-polysulfone-, blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyethers, preparation

(polyketone-polysulfone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyethers, preparation

(polysulfide-, polyketones-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyethers, preparation

Polyethers, preparation

Polyimides, preparation

(polysulfone-, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyethers, preparation

(polysulfone-; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT **Fuel cells**

Ionic conductors

Polymer electrolytes

(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polymer blends

(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT **Electrodes**

(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, **electrodes**, and **fuel cells**)

IT Polyoxyarylenes

(protonic acid-contg.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polyoxyphenylenes
(sodium sulfonated; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT Polybenzoxazoles
(sulfonated; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 25134-01-4DP, Poly(2,6-dimethyl-1,4-phenylene oxide), sodium sulfonated
(assumed monomers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 31694-16-3DP, PEEK 450P, sodium sulfonated
(blend with polyether-polyketone or polybenzoxazole, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 515144-49-7P 515144-50-0P 515144-51-1P 515144-53-3P
(blend with polyimide; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 29658-28-4P 32034-67-6P
(blend with protonic acid group contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 87781-17-7P 87792-34-5P
(blend with protonic acid group contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 25897-65-8P, Bisphenol A-4,4'-difluorobenzophenone copolymer
28825-50-5P, 3,3',4,4'-Benzophenonetetracarboxylic dianhydride-3,3'-Diaminodiphenylsulfone copolymer 41205-96-3P
54571-77-6P 127583-87-3P 127669-56-1P 515144-54-4P
515144-55-5P
(blend with protonic acid group-contg. polymer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 515144-56-6P 515144-57-7P
(blend with protonic acid group-contg. polymers; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 108-31-6DP, Maleic anhydride, reaction products with protonic acid

group-contg. polymers 405-99-2DP, 4-Fluorostyrene, reaction products with sulfonated polymers 620-18-8DP, 3-Vinylphenol, reaction products with sulfonated polymers 1076-99-9DP, 4-Allylbenzoic acid, reaction products with protonic acid group-contg. polymers 1120-71-4DP, Propanesultone, reaction products with arom. polyether-polyketones 1745-89-7DP, reaction products with sulfonated polymers 20161-52-8DP, reaction products with sulfonated polymers 102501-86-0DP, 2-Allylphenol-2,6-dimethylphenol copolymer, sodium sulfonated 146673-88-3DP, reaction products with ethylenically unsatd. compds.

163395-54-8DP, reaction products with protonic acid group-contg.

polymers 210531-46-7DP, reaction products with ethenylphenol

342047-78-3DP, reaction products with ethenylphenol

342047-79-4DP, reaction products with ethenylphenol

515144-35-1P 515144-36-2P 515144-37-3P 515144-38-4P

515144-39-5P 515144-40-8P 515144-41-9P 515144-42-0P

515144-44-2DP, sulfonated 515144-45-3DP, sulfonated 515144-47-5P

515144-48-6P 515144-51-1DP, reaction products with ethenylbenzoyl chloride 515144-53-3DP, reaction products with ethenylbenzoyl chloride 515144-58-8P **515144-59-9P** 515144-66-8DP,

reaction products with ethenylphenol 515144-67-9DP, reaction

products with ethenylphenol 515144-68-0DP, reaction products with ethenylphenol 515144-69-1DP, reaction products with ethenylphenol

515144-70-4DP, reaction products with ethylenically unsatd. compds.

515144-71-5DP, reaction products with monoanhydride compds.

515144-72-6DP, reaction products with maleic anhydride

515144-73-7DP, reaction products with allylbenzoic acid, sulfonated

515144-74-8DP, reaction products with allylbenzoic acid, sulfonated

515144-75-9DP, reaction products with ethylenically unsatd. compds.

(crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 51698-33-0P 210531-45-6P 515144-46-4P
(monomer; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 515144-24-8P 515144-34-0P
(optionally crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 515144-43-1DP, sulfonated
(polybenzoxazole, crosslinked; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 24938-67-8DP, Poly(2,6-dimethyl-1,4-phenylene oxide), sodium sulfonated 267877-35-0DP, reaction products with ethenylphenol 515144-25-9P 515144-26-0P 515144-27-1P 515144-28-2P

515144-29-3P 515144-30-6P 515144-31-7P 515144-32-8P
515144-33-9P 515144-60-2P 515144-61-3P 515144-62-4P
515144-64-6DP, sulfonated 515144-65-7DP, sulfonated
515811-98-0P

(prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

IT 80-05-7, 2,2-Bis(4-hydroxyphenyl)propane, reactions 80-07-9,
4,4'-Dichlorodiphenylsulfone 345-92-6, 4,4'-Difluorobenzophenone
(reactant in monomer prepn.; prepn. of crosslinkable arom. resins having protonic acid groups for ion conductive polymer membranes, binders, and **fuel cells**)

RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> D L43 1-8 BIB ABS HITSTR HITIND

L43 ANSWER 1 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 140:324161 HCA Full-text

TI Sulfonic acid group-containing polyimide compositions and their membranes with high proton conductivity for **fuel cells**

IN Kuromatsu, Hidehisa; Minamimura, Kiyoyuki

PA Kanegafuchi Chemical Industry Co., Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 26 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|------|----------|-----------------|----------|
| PI | JP 2004107484 | A | 20040408 | JP 2002-271858 | 20020918 |
| | | | | | 18 |

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PRAI JP 2002-271858 20020918 <--

AB The compns., useful for solid polymer electrolyte **fuel cells**, direct methanol **fuel cells**, comprise polyimides contg. (A) repeating units prep'd. from (a) components having ≥ 3 amino groups and tetracarboxylic dianhydride or (b) components having ≥ 3 acid anhydride groups and diamines and (B) repeating units prep'd. from diamines having sulfonic acid-contg. groups on arom. rings and tetracarboxylic dianhydrides. The polyimide membranes show good water and oxidn. resistance and low methanol permeability.

IT 677342-69-7P 677342-73-3P

(sulfonic acid group-contg. polyimide compns. for **fuel**
cell membranes with high proton cond.)

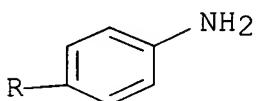
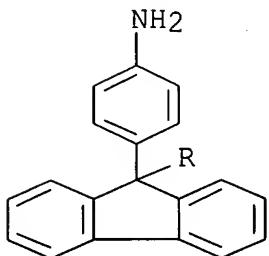
RN 677342-69-7 HCA

CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone,
[1,1'-biphenyl]-3,3',4,4'-tetramine and 4,4'-(9H-fluoren-9-
ylidene)bis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 15499-84-0

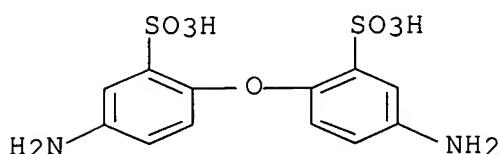
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CM 2

CRN 6375-06-0

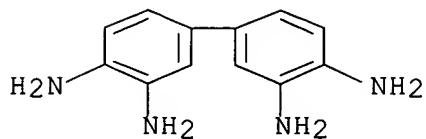
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CM 3

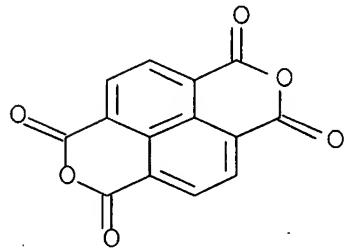
CRN 91-95-2

CMF C12 H14 N4



CM 4

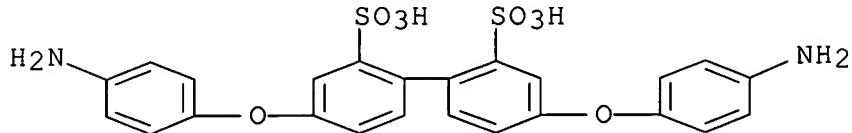
CRN 81-30-1
CMF C14 H4 O6



RN 677342-73-3 HCA
CN [1,1'-Biphenyl]-2,2'-disulfonic acid, 4,4'-bis(4-aminophenoxy)-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone, [1,1'-biphenyl]-3,3',4,4'-tetramine and 4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (9CI) (CA INDEX NAME)

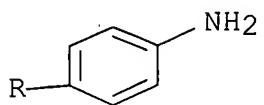
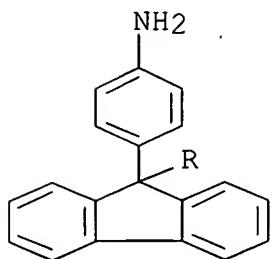
CM 1

CRN 677342-72-2
CMF C24 H20 N2 O8 S2



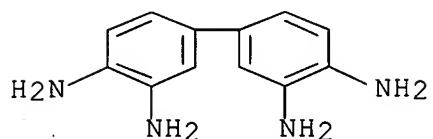
CM 2

CRN 15499-84-0
CMF C25 H20 N2



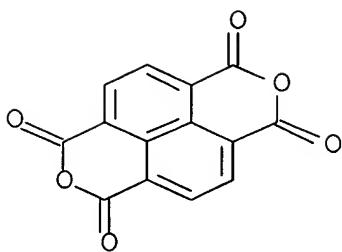
CM 3

CRN 91-95-2
CMF C12 H14 N4



CM 4

CRN 81-30-1
CMF C14 H4 O6



IC ICM C08G073-10
ICS C08J005-22; H01B001-06; H01M008-02; H01M008-10; C08L079-08
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76
ST sulfonic polyimide **fuel cell** polymer electrolyte
membrane; direct methanol **fuel cell** ion
conductor polyimide; aminosulfophenyl aminophenylfluorene
aminobenzidine naphthalenetetracarboxylic dianhydride polyimide
membrane
IT Polyimides, uses
(cardo; sulfonic acid group-contg. polyimide compns. for
fuel cell membranes with high proton cond.)
IT **Fuel cells**
(direct methanol-type; sulfonic acid group-contg. polyimide
compns. for **fuel cell** membranes with high
proton cond.)
IT Polyimides, uses
(polyether-, cardo; sulfonic acid group-contg. polyimide compns.
for **fuel cell** membranes with high proton
cond.)
IT Cardo polymers
(polyether-polyimides; sulfonic acid group-contg. polyimide
compns. for **fuel cell** membranes with high
proton cond.)
IT Polyethers, uses
(polyimide-, cardo; sulfonic acid group-contg. polyimide compns.
for **fuel cell** membranes with high proton
cond.)
IT Cardo polymers
(polyimides; sulfonic acid group-contg. polyimide compns. for
fuel cell membranes with high proton cond.)
IT Ionic conductors
(polymeric; sulfonic acid group-contg. polyimide compns. for
fuel cell membranes with high proton cond.)
IT Membranes, nonbiological

(proton-conducting; sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

IT **Fuel cells**

(solid electrolyte, polymer electrolyte **fuel cells**; sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

IT **Fuel cell electrolytes**

Polymer electrolytes

(sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

IT 677342-69-7P 677342-73-3P 677342-76-6P

677342-80-2P

(sulfonic acid group-contg. polyimide compns. for **fuel cell** membranes with high proton cond.)

L43 ANSWER 2 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 140:5888 HCA Full-text

TI Polyimide porous film composites and creep-resistant proton-conducting films therefrom for **fuel cells**

IN Oya, Nobuo; Yao, Shigeru; Kiuchi, Masayuki; Hirano, Tetsuji

PA Ube Industries, Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 8 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|------|----------|-----------------|----------|
| PI | JP 2003335895 | A | 20031128 | JP 2002-147701 | 20020522 |

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PRAI JP 2002-147701 20020522 <--

AB The composites comprise (A) polyimide porous films and (B) (proton-conducting) (in)org. materials with high heat resistance filled in the pores and held by phys./chem. interaction. Thus, a polyimide porous film of 3,3',4,4'-biphenyltetracarboxylic dianhydride-4,4'-diaminodiphenyl ether copolymer was impregnated with 4,4'-bis(4-aminophenoxy)biphenyl-3,3'-disulfonic acid triethylamine salt-1,4,5,8-naphthalenetetracarboxylic acid copolymer and immersed in 1N HCl to give a proton-conducting film showing ion cond. 2.1×10^{-2} S/cm at 60° and 90% relative humidity.

IT 627904-72-7P 627904-73-8P

(in-pore proton conductors; proton-conducting polyimide porous film composites for **fuel cells**)

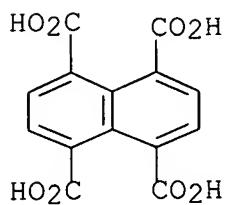
RN 627904-72-7 HCA

CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with
4,4'-bis(4-aminophenoxy)[1,1'-biphenyl]-3,3'-disulfonic acid compd.
with N,N-diethylethanamine (1:2) (9CI) (CA INDEX NAME)

CM 1

CRN 128-97-2

CMF C14 H8 O8



CM 2

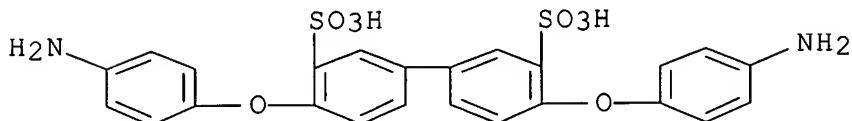
CRN 627904-71-6

CMF C24 H20 N2 O8 S2 , 2 C6 H15 N

CM 3

CRN 500295-67-0

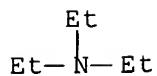
CMF C24 H20 N2 O8 S2



CM 4

CRN 121-44-8

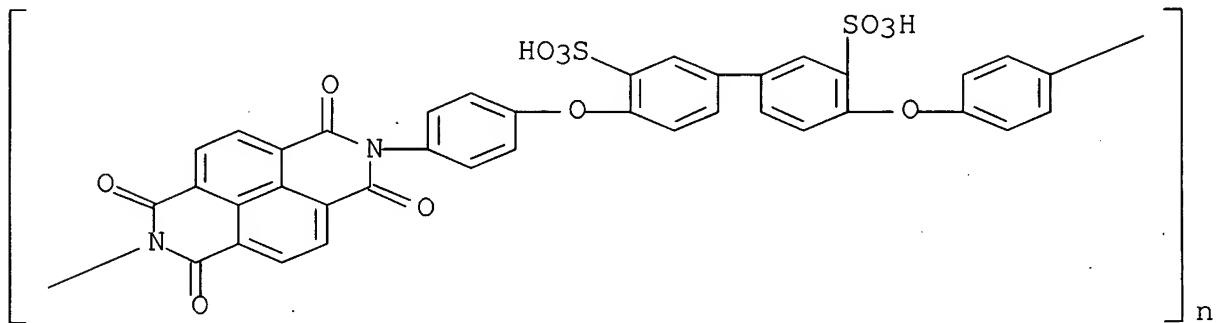
CMF C6 H15 N



RN 627904-73-8 HCA
CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[1mn][3,8]phenanthroline-2,7-diyl)-1,4-phenyleneoxy(3,3'-disulfo[1,1'-biphenyl]-4,4'-diyl)oxy-1,4-phenylene compd. with N,N-diethylethanamine (1:2)] (9CI) (CA INDEX NAME)

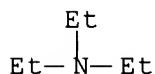
CM 1

CRN 500295-69-2
CMF (C38 H20 N2 O12 S2)n
CCI PMS



CM 2

CRN 121-44-8
CMF C6 H15 N



IC ICM C08J009-36
ICS H01B001-06; H01M008-02; H01M008-10; C08L079-08
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST **fuel cell** proton conductor porous polyimide film
filler composite; sulfonated polyimide polyether filled proton
conducting porous membrane; biphenylcarboxylic anhydride aminophenyl

ether copolymer porous film ion conductor;
aminophenoxybiphenylsulfonic acid naphthalene carboxylic acid
copolymer proton conductor

IT Heat-resistant materials
(*in*org.; proton-conducting polyimide porous film composites for
fuel cells)

IT Films
(elec. conductive; proton-conducting polyimide porous film
composites for **fuel cells**)

IT Electric conductors
Porous materials
(films; proton-conducting polyimide porous film composites for
fuel cells)

IT Polyimides, uses
(polyether-, porous; proton-conducting polyimide porous film
composites for **fuel cells**)

IT Polyimides, uses
(polyether-, sulfo-contg., in-pore proton conductors;
proton-conducting polyimide porous film composites for
fuel cells)

IT Polysulfones, uses
(polyether-, sulfonated, block, in-pore proton conductors;
proton-conducting polyimide porous film composites for
fuel cells)

IT Polyethers, uses
(polyimide-, porous; proton-conducting polyimide porous film
composites for **fuel cells**)

IT Polyethers, uses
(polyimide-, sulfo-contg., in-pore proton conductors;
proton-conducting polyimide porous film composites for
fuel cells)

IT Polyethers, uses
(polysulfone-, sulfonated, block, in-pore proton conductors;
proton-conducting polyimide porous film composites for
fuel cells)

IT Films
(porous; proton-conducting polyimide porous film composites for
fuel cells)

IT Polyimides, uses
(porous; proton-conducting polyimide porous film composites for
fuel cells)

IT Composites
Fuel cells
(proton-conducting polyimide porous film composites for
fuel cells)

IT Ionic conductors
(proton; proton-conducting polyimide porous film composites for

fuel cells)

IT Polyethers, uses
(sulfonated, in-pore proton conductors; proton-conducting polyimide porous film composites for **fuel cells**
)

IT 13080-85-8, 4,4'-Bis(4-aminophenoxy)biphenyl
(in prepn. of sulfonated polyimides; proton-conducting polyimide porous film composites for **fuel cells**)

IT 475096-53-8DP, sulfonated **627904-72-7P**
627904-73-8P
(in-pore proton conductors; proton-conducting polyimide porous film composites for **fuel cells**)

IT 26298-81-7P, 3,3',4,4'-Biphenyltetracarboxylic dianhydride-4,4'-diaminodiphenyl ether copolymer 26615-45-2P
(porous; proton-conducting polyimide porous film composites for **fuel cells**)

L43 ANSWER 3 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 138:224172 HCA Full-text

TI Hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**

IN Okamoto, Kenichi; Kita, Hidetoshi; Fang, Jian-Hua; Hirano, Tetsuji

PA Yamaguchi T.L.O. Y. K., Japan; Ube Industries, Ltd.

SO Jpn. Kokai Tokkyo Koho, 11 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|------|----------|-----------------|----------|
| PI | JP 2003068326 | A | 20030307 | JP 2001-254725 | 20010824 |

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| | | | |
|------|----------------|----|--------------|
| PRAI | JP 3910026 | B2 | 20070425 |
| | JP 2001-254725 | | 20010824 <-- |

AB Title polyimide electrolyte membrane is characterized in that the polyimide is prep'd. from diamines including sulfonated arom. diamine H2NA1D1A1NH2 or H2NA2D2A3D2A2NH2 [D1, D2 = O, CH2, C(CH3)2, C(CF3)2, S; A1 = (C1-2 alkyl-substituted) monosulfonated benzene ring; A2 = (C1-2 alkyl-substituted) benzene ring; A3 = sulfonated arom. group with certain specific structure].

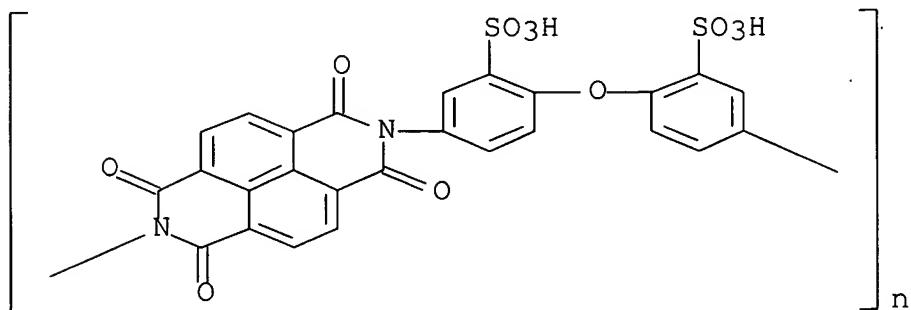
IT **444075-08-5P 500295-68-1P 500295-69-2P**
500295-74-9P 500295-76-1P 500295-77-2P
500907-46-0P

(hydrolysis-resistant polyimide electrolyte membrane for

fuel cell)

RN 444075-08-5 HCA

CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[1mn] [3,8]phenanthroline-2,7-diyl) (3-sulfo-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)] (9CI)
(CA INDEX NAME)



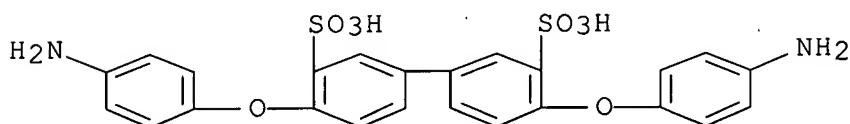
RN 500295-68-1 HCA

CN [1,1'-Biphenyl]-3,3'-disulfonic acid, 4,4'-bis(4-aminophenoxy)-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone (CA INDEX NAME)

CM 1

CRN 500295-67-0

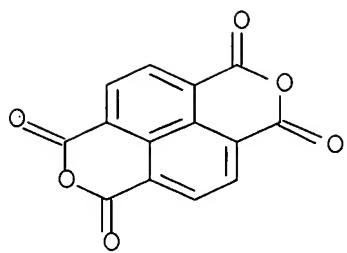
CMF C24 H20 N2 O8 S2



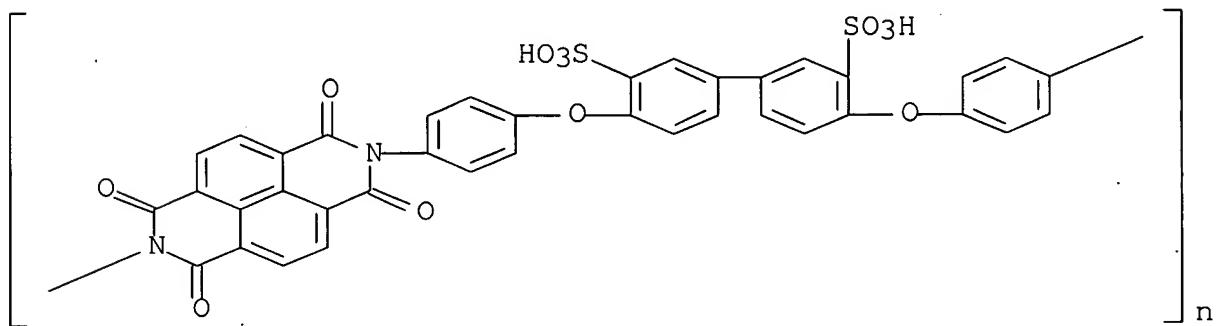
CM 2

CRN 81-30-1

CMF C14 H4 O6



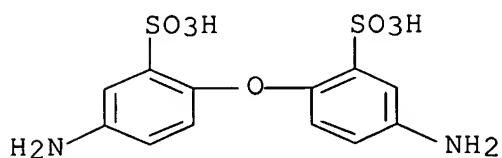
RN 500295-69-2 HCA
CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[1mn][3,8]phenanthroline-2,7-diyl)-1,4-phenyleneoxy(3,3'-disulfo[1,1'-biphenyl]-4,4'-diyl)oxy-1,4-phenylene] (CA INDEX NAME)



RN 500295-74-9 HCA
CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with
2,2'-oxybis[5-aminobenzenesulfonic acid] (9CI) (CA INDEX NAME)

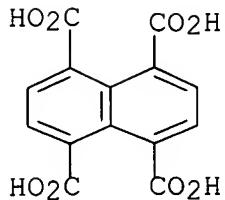
CM 1

CRN 6375-06-0
CMF C12 H12 N2 O7 S2



CM 2

CRN 128-97-2
CMF C14 H8 O8

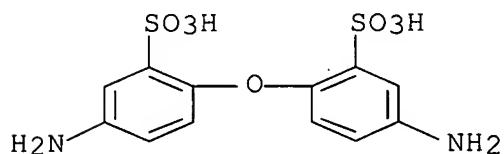


RN 500295-76-1 HCA

CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with
2,2'-oxybis[5-aminobenzenesulfonic acid] and 4,4'-
oxybis[benzenamine] (9CI) (CA INDEX NAME)

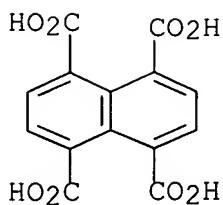
CM 1

CRN 6375-06-0
CMF C12 H12 N2 O7 S2



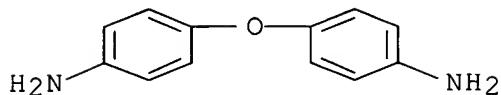
CM 2

CRN 128-97-2
CMF C14 H8 O8



CM 3

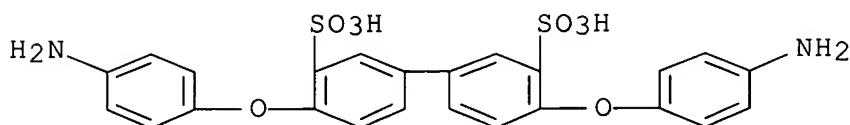
CRN 101-80-4
CMF C12 H12 N2 O



RN 500295-77-2 HCA
CN 1,4,5,8-Naphthalenetetracarboxylic acid, polymer with
4,4'-bis(4-aminophenoxy)[1,1'-biphenyl]-3,3'-disulfonic acid and
4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (9CI) (CA INDEX NAME)

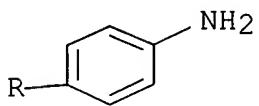
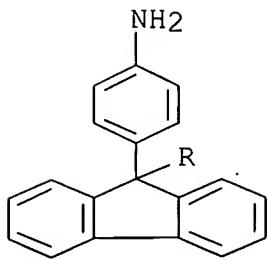
CM 1

CRN 500295-67-0
CMF C24 H20 N2 O8 S2



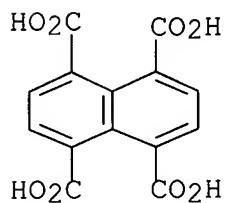
CM 2

CRN 15499-84-0
CMF C25 H20 N2



CM 3

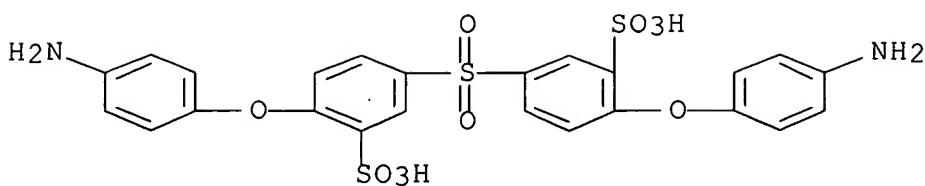
CRN 128-97-2
CMF C14 H8 O8



RN 500907-46-0 HCA
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-(4-aminophenoxy)-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 3,3'-dimethyl[1,1'-biphenyl]-4,4'-diamine (9CI) (CA INDEX NAME)

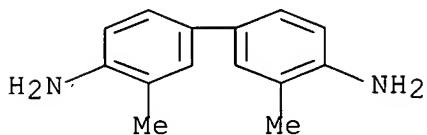
CM 1

CRN 500295-70-5
CMF C24 H20 N2 O10 S3



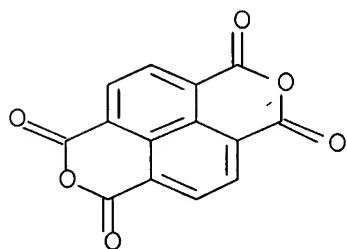
CM 2

CRN 119-93-7
CMF C14 H16 N2



CM 3

CRN 81-30-1
CMF C14 H4 O6



IC ICM H01M008-02

ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polyimide electrolyte membrane hydrolysis resistant **fuel**
cell

IT Polyimides, uses

(cardo; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Fuel cells
(hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyimides, uses
(polyether-, cardo; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyimides, uses
(polyether-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polysulfones, uses
(polyether-polyimide-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Cardo polymers
(polyether-polyimides; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyimides, uses
(polyether-polysulfone-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyethers, uses
(polyimide-, cardo; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyethers, uses
(polyimide-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Polyethers, uses
(polyimide-polysulfone-; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Cardo polymers
(polyimides; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT Electrolytes
(polymer membrane; hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT 444075-08-5P 455944-27-1P 500295-68-1P
500295-69-2P 500295-73-8P 500295-74-9P
500295-75-0P 500295-76-1P 500295-77-2P
500907-46-0P
(hydrolysis-resistant polyimide electrolyte membrane for **fuel cell**)

IT 455944-24-8P, 9,9-Bis(4-aminophenyl)fluorene-2,7-disulfonic acid
500295-67-0P, 4,4'-Bis(4-aminophenoxy)biphenyl-3,3'-disulfonic acid
500295-70-5P
(prepn. of polyimide for electrolyte membrane of **fuel cell**)

IT 6375-06-0P

(prepn. of polyimide for electrolyte membrane of **fuel cell**)

IT 80-09-1, 4,4'-Dihydroxydiphenyl sulfone 101-80-4,
4,4'-Oxydianiline 350-46-9, 4-Fluoronitrobenzene 13080-85-8,
4,4'-Bis(4-aminophenoxy)biphenyl 15499-84-0, 9,9-Bis(4-
aminophenyl)fluorene
(prepn. of polyimide for electrolyte membrane of **fuel cell**)

L43 ANSWER 4 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 138:58840 HCA Full-text

TI Novel Sulfonated Polyimides as Polyelectrolytes for **Fuel Cell** Application. 1. Synthesis, Proton Conductivity, and Water Stability of Polyimides from 4,4'-Diaminodiphenyl Ether-2,2'-disulfonic Acid

AU Fang, Jianhua; Guo, Xiaoxia; Harada, Satoshi; Watari, Tatsuya; Tanaka, Kazuhiro; Kita, Hidetoshi; Okamoto, Kenchi

CS Department of Advanced Materials Science Engineering Faculty of Engineering, Yamaguchi University, Yamaguchi, 755-8611, Japan

SO Macromolecules (2002), 35(24), 9022-9028

CODEN: MAMOBX; ISSN: 0024-9297

PB American Chemical Society

DT Journal

LA English

AB A sulfonated diamine monomer, 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid (ODADS), was successfully synthesized by direct sulfonation of a com. available diamine, 4,4'-diaminodiphenyl ether (ODA), using fuming sulfuric acid as the sulfonating reagent. A series of sulfonated polyimides were prep'd. from 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTDA), ODADS, and common nonsulfonated diamines. The resulting sulfonated polyimides displayed much better stability toward water than those derived from the widely used sulfonated diamine 2,2'-benzidinedisulfonic acid (BDSA). This is because ODADS-based polyimide membranes have a more flexible structure than the corresponding BDSA-based ones. Fenton's reagent test revealed that ODADS-based polyimide membranes also had fair good stability to oxidn. Polyimide membranes with good water stability as well as high proton cond. were developed. NTDA-ODADS/BAPB (1:1) copolyimide membrane (BAPB refers to 4,4'-bis(4-aminophenoxy)biphenyl), for example, did not lose mech. properties after being soaked in water at 80° for 200 h, while its proton cond. was still at a high level (comparable to that of Nafion 117).

IT 444075-07-4P 444075-08-5P 455944-36-2P

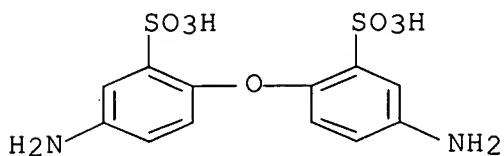
479201-86-0P 479201-87-1P 479201-88-2P

(synthesis, proton cond., and water stability of sulfonated polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid as electrolytes for **fuel cells**)

RN 444075-07-4 HCA
CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with
[2]benzopyrano[6,5,4-def] [2]benzopyran-1,3,6,8-tetrone (9CI) (CA
INDEX NAME)

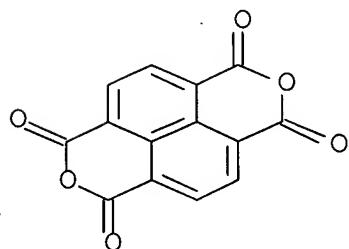
CM 1

CRN 6375-06-0
CMF C12 H12 N2 O7 S2

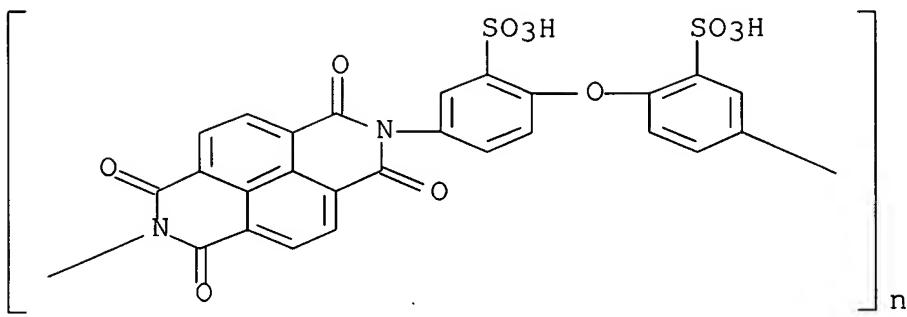


CM 2

CRN 81-30-1
CMF C14 H4 O6



RN 444075-08-5 HCA
CN Poly[(1,3,6,8-tetrahydro-1,3,6,8-tetraoxobenzo[1mn] [3,8]phenanthroli-
ne-2,7-diyl) (3-sulfo-1,4-phenylene)oxy(2-sulfo-1,4-phenylene)] (9CI)
(CA INDEX NAME)



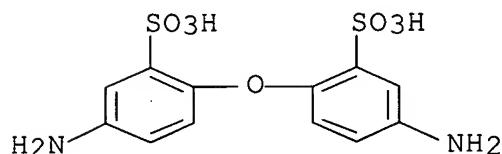
RN 455944-36-2 HCA

CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-oxybis[benzenamine] (9CI) (CA INDEX NAME)

CM 1

CRN 6375-06-0

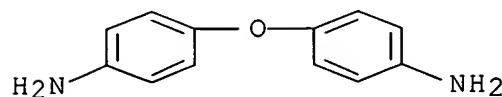
CMF C12 H12 N2 O7 S2



CM 2

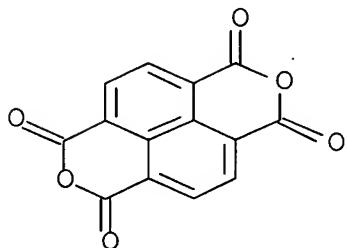
CRN 101-80-4

CMF C12 H12 N2 O



CM 3

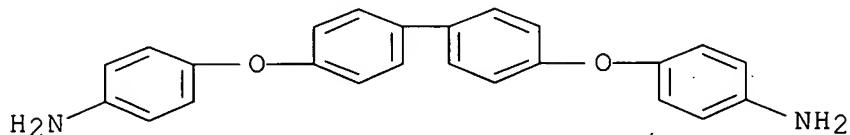
CRN 81-30-1
CMF C14 H4 O6



RN 479201-86-0 HCA
CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-(1,1'-biphenyl)-4,4'-diylbis(oxy)]bis[benzenamine] (CA INDEX NAME)

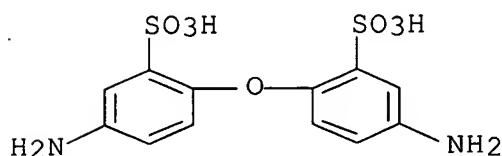
CM 1

CRN 13080-85-8
CMF C24 H20 N2 O2



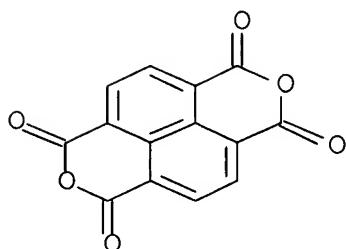
CM 2

CRN 6375-06-0
CMF C12 H12 N2 O7 S2



CM 3

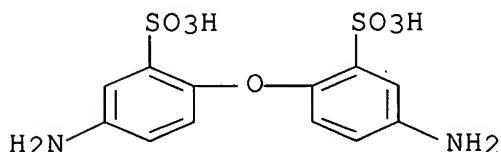
CRN 81-30-1
CMF C14 H4 O6



RN 479201-87-1 HCA
CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and
4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[benzenamine]
(9CI) (CA INDEX NAME)

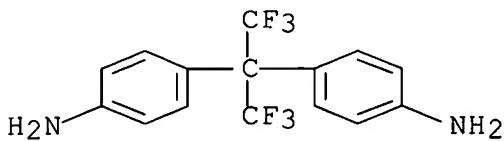
CM 1

CRN 6375-06-0
CMF C12 H12 N2 O7 S2



CM 2

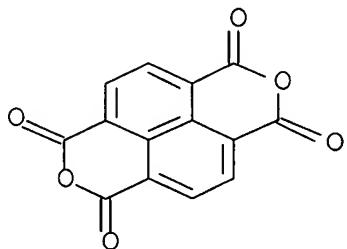
CRN 1095-78-9
CMF C15 H12 F6 N2



CM 3

CRN 81-30-1

CMF C14 H4 06



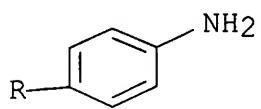
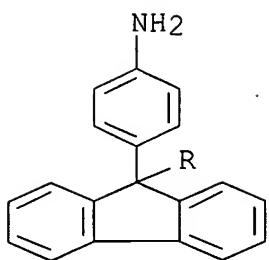
RN 479201-88-2 HCA

CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and 4,4'-(9H-fluoren-9-ylidene)bis[benzenamine] (CA INDEX NAME)

CM 1

CRN 15499-84-0

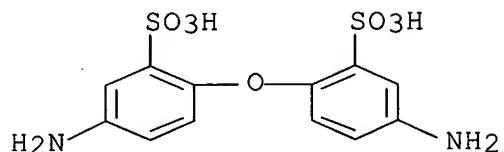
CMF C25 H20 N2



CM 2

CRN 6375-06-0

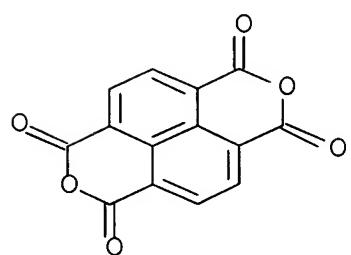
CMF C12 H12 N2 O7 S2.



CM 3

CRN 81-30-1

CMF C14 H4 O6



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 35, 38
ST aminodiphenyl ether disulfonic acid polyimide electrolyte
fuel cell
IT Polyimides, uses
(sulfonated; synthesis, proton cond., and water stability of sulfonated polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid as electrolytes for **fuel cells**)
IT **Fuel cell** electrolytes
(synthesis, proton cond., and water stability of sulfonated polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid as electrolytes for **fuel cells**)
IT 444075-07-4P 444075-08-5P 455944-36-2P
479201-86-0P 479201-87-1P 479201-88-2P
(synthesis, proton cond., and water stability of sulfonated polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid as electrolytes for **fuel cells**)
IT 6375-06-0P
(synthesis, proton cond., and water stability of sulfonated polyimides from 4,4'-diaminodiphenyl ether-2,2'-disulfonic acid as electrolytes for **fuel cells**)
RE.CNT 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 5 OF 8 HCA COPYRIGHT 2007 ACS on STN
AN 137:281852 HCA Full-text
TI Ion-conducting polymer, membrane of the conducting polymer, and
fuel cell
IN Morizono, Kenichi; Tsukamoto, Koji
PA Mitsui Chemicals Inc., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF

DT Patent

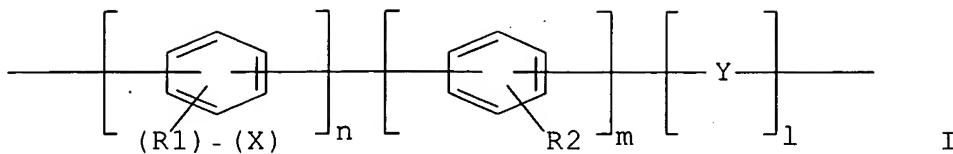
LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|------|----------|-----------------|--------------|
| PI | JP 2002289222 | A | 20021004 | JP 2001-88889 | 200103 26 |

<--

PRAI JP 2001-88889 20010326 <--
GI



AB The polymer has protonic acid groups attached to a polymer main chain via spacer structures having ≥ 1 C atoms. The polymer is preferably I, where R1 and R2 are H or various substituents, Y = single bond, arylene, heteroarylene group, various org. and inorg. groups or a combination thereof; n = integer ≥ 1 , m and l = integer ≥ 0 , and $(l+m+n) \geq 4$. The polymer is useful as electrolyte membrane for **fuel cells**.

IT **466696-81-1P 466696-82-2P 466696-83-3P**

(structure of proton conducting polymers for electrolyte membranes in **fuel cells**)

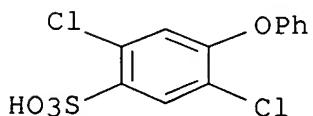
RN 466696-81-1 HCA

CN Benzenesulfonic acid, 2,5-dichloro-4-phenoxy-, polymer with dichlorobenzene (9CI) (CA INDEX NAME)

CM 1

CRN 466696-80-0

CMF C12 H8 Cl2 O4 S



CM 2

CRN 25321-22-6

CMF C6 H4 Cl2

CCI IDS



2 (D1-C1)

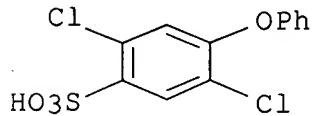
RN 466696-82-2 HCA

CN Benzenesulfonic acid, 2,5-dichloro-4-phenoxy-, polymer with
(3,4-dichlorophenyl)phenylmethanone (9CI) (CA INDEX NAME)

CM 1

CRN 466696-80-0

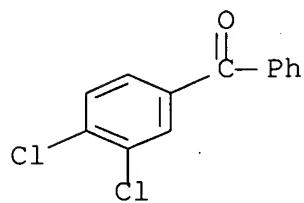
CMF C12 H8 Cl2 O4 S



CM 2

CRN 6284-79-3

CMF C13 H8 Cl2 O

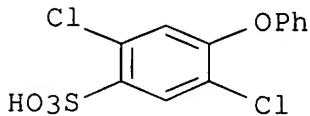


RN 466696-83-3 HCA

CN Benzenesulfonic acid, 2,5-dichloro-4-phenoxy-, polymer with
bis(4-chlorophenyl)methanone (9CI) (CA INDEX NAME)

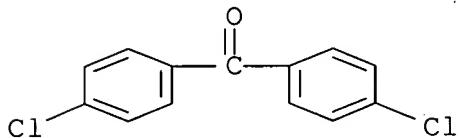
CM 1

CRN 466696-80-0
CMF C12 H8 Cl2 O4 S



CM 2

CRN 90-98-2
CMF C13 H8 Cl2 O



IC ICM H01M008-02
ICS C08G061-10; H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **fuel cell** electrolyte ion conducting polymer
membrane
IT **Fuel cell** electrolytes
(structure of proton conducting polymers for electrolyte
membranes in **fuel cells**)
IT **466696-81-1P 466696-82-2P 466696-83-3P**
(structure of proton conducting polymers for electrolyte
membranes in **fuel cells**)
L43 ANSWER 6 OF 8 HCA COPYRIGHT 2007 ACS on STN
AN 137:217917 HCA Full-text
TI Novel Sulfonated Polyimides as Polyelectrolytes for **Fuel**
Cell Application. 2. Synthesis and Proton Conductivity of
Polyimides from 9,9-Bis(4-aminophenyl)fluorene-2,7-disulfonic Acid
AU Guo, Xiaoxia; Fang, Jianhua; Watari, Tatsuya; Tanaka, Kazuhiro;
Kita, Hidetoshi; Okamoto, Kenichi
CS Faculty of Engineering, Department of Advanced Materials Science &

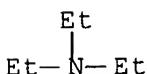
SO Engineering, Yamaguchi University, Ube, Yamaguchi, 755-8611, Japan
Macromolecules (2002), 35(17), 6707-6713
CODEN: MAMOBX; ISSN: 0024-9297
PB American Chemical Society
DT Journal
LA English
AB A new sulfonated diamine monomer, 9,9-bis(4-aminophenyl)fluorene-2,7-disulfonic acid (BAPFDS), was synthesized by direct sulfonation of the parent diamine, 9,9-bis(4-aminophenyl)fluorene (BAPF), using fuming sulfuric acid as the sulfonating reagent. A series of sulfonated polyimides with different sulfonation degrees were prepd. from 1,4,5,8-naphthalenetetracarboxylic dianhydride (NTDA), BAPFDS, and common nonsulfonated diamines. The resulting sulfonated polyimides generally showed good solv. in m-cresol and DMSO. Proton conductivities of these polyimide membranes were measured as the functions of relative humidity and temp. The resulting homopolyimide, NTDA-BAPFDS, displayed proton conductivities quite similar to those of Nafion 117 in the whole humidity range (RH < 100%). At 100% relative humidity, all the BAPFDS-based polyimide membranes showed proton conductivities similar to or higher than those of Nafion 117. In addn., BAPFDS-based polyimide membranes exhibited much better water stability than those derived from a widely used sulfonated diamine, 2,2'-benzidinedisulfonic acid (BDSA), with similar IEC (ion exchange capacity). This is probably because of the higher basicity of BAPFDS, which is favorable for maintaining the stability of imido rings.

IT 455944-37-3P
(synthesis and proton cond. of polyimides from
9,9-bis(4-aminophenyl)fluorene-2,7-disulfonic acid)
RN 455944-37-3 HCA
CN Benzenesulfonic acid, 2,2'-oxybis[5-amino-, polymer with
[2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and
4,4'-oxybis[benzenamine], compd. with N,N-diethylethanamine (9CI)
(CA INDEX NAME)

CM 1

CRN 121-44-8

CMF C6 H15 N



CM 2

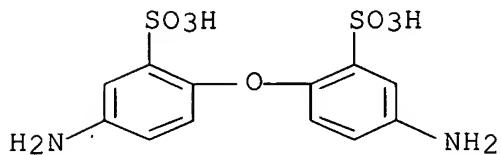
CRN 455944-36-2

CMF (C14 H4 O6 . C12 H12 N2 O7 S2 . C12 H12 N2 O) x
CCI PMS

CM 3

CRN 6375-06-0

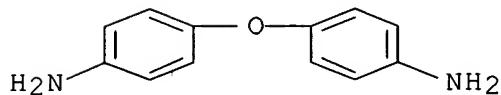
CMF C12 H12 N2 O7 S2



CM 4

CRN 101-80-4

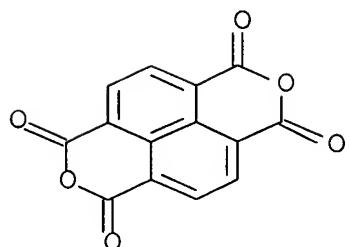
CMF C12 H12 N2 O



CM 5

CRN 81-30-1

CMF C14 H4 O6



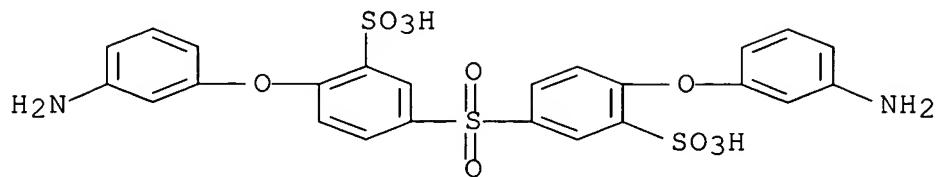
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 35, 37
IT 455944-26-0P 455944-28-2P 455944-30-6P 455944-33-9P
455944-35-1P **455944-37-3P**
(synthesis and proton cond. of polyimides from
9,9-bis(4-aminophenyl)fluorene-2,7-disulfonic acid)
RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 7 OF 8 HCA COPYRIGHT 2007 ACS on STN
AN 137:6509 HCA Full-text
TI Synthesis and characterization of sulfonated polyimides based on
six-membered ring as proton exchange membranes
AU Hong, Young-Taik; Einsla, Brian; Kim, Yuseung; McGrath, James E.
CS Dep. Chem. Materials Res. Inst., Virginia Polytechnic Inst. State
Univ., Blacksburg, VA, 24061, USA
SO Polymer Preprints (American Chemical Society, Division of Polymer
Chemistry) (2002), 43(1), 666-667
CODEN: ACPPAY; ISSN: 0032-3934
PB American Chemical Society, Division of Polymer Chemistry
DT Journal; (computer optical disk)
LA English
AB Arom. six-membered ring polyimides contg. pendant sulfonic acid
groups appear to be promising materials for proton exchange membrane
fuel cell applications. 3,3'-Disulfonic acid-bis[4-(3-
aminophenoxy)phenyl] sulfone (SA-DADPS) as a sulfonated diamine
monomer was prep'd. by nucleophilic substitution of sodium 3,3'-
disulfonate-4,4'-dichlorodiphenyl sulfone (S-DCDPS) with m-
aminophenol. A series of copolyimides contg. sulfonic acid
functional groups were synthesized from six-membered dianhydrides,
SA-DADPS and m-BAPS via high-temp. direct polycondensation using m-
cresol as a solvent. The copolyimides were characterized for mol.
wt., chem. compn., thermal stability, solvent solv. and film forming
properties via soln. casting from DMAc. The materials are of
interest as new polymeric electrolyte proton exchange membranes.
IT **433683-42-2P**
(synthesis and characterization of sulfonated
polyether-polysulfone-polyimides based on
naphthalenetetracarboxylic dianhydride for proton exchange
membranes)
RN 433683-42-2 HCA
CN Benzenesulfonic acid, 3,3'-sulfonylbis[6-(3-aminophenoxy)-, polymer
with [2]benzopyrano[6,5,4-def][2]benzopyran-1,3,6,8-tetrone and
3,3'-[sulfonylbis(4,1-phenyleneoxy)]bis[benzenamine] (CA INDEX

NAME)

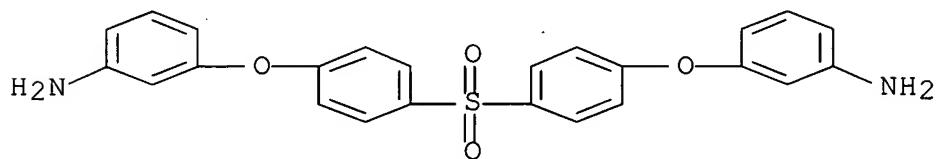
CM 1

CRN 433683-41-1
CMF C24 H20 N2 O10 S3



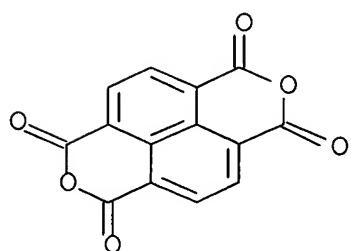
CM 2

CRN 30203-11-3
CMF C24 H20 N2 O4 S



CM 3

CRN 81-30-1
CMF C14 H4 O6



CC 35-5 (Chemistry of Synthetic High Polymers)

IT **433683-42-2P**

(synthesis and characterization of sulfonated polyether-polysulfone-polyimides based on naphthalenetetracarboxylic dianhydride for proton exchange membranes)

RE.CNT 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 8 OF 8 HCA COPYRIGHT 2007 ACS on STN

AN 127:280784 HCA Full-text

TI Aromatic polymer electrolyte membranes and their manufacture for **fuel cells**

IN Azuma, Ryuji; Nagai, Kenji; Kondo, Masako; Murase, Kazuhisa; Takada, Chikayuki

PA Aisin AW Co., Japan; Echos Research K. K.

SO Jpn. Kokai Tokkyo Koho, 5 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

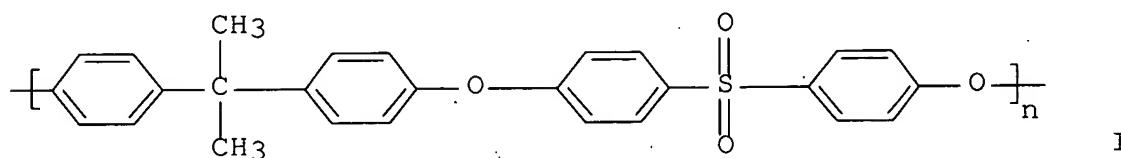
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|-------------|------|----------|-----------------|--------------|
| PI | JP 09245818 | A | 19970919 | JP 1996-69448 | 199602 29 |

<--

PRAI JP 1996-69448 19960229 <--

GI



AB The electrolyte membranes are composed of sulfonated polysulfone I, contg. SO3H groups attached to the arom. ring in the repeating units to an ion exchange capacity 1.6-3.2 mmol/g, and have compressive strength \geq 80 kg/cm². The electrolyte membranes are prep'd. by

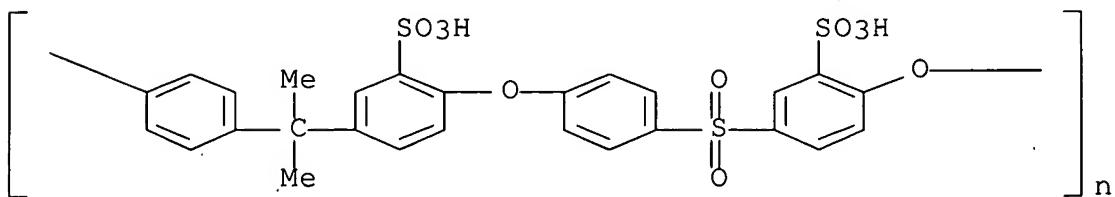
applying a soln. of the sulfonated polysulfone on a substrate and heat treating at 40-80° for ≥12 h. The electrolyte membranes have long lifetime.

IT 196301-55-0

(structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

RN 196301-55-0 HCA

CN Poly[oxy(2-sulfo-1,4-phenylene)sulfonyl-1,4-phenyleneoxy(2-sulfo-1,4-phenylene)(1-methylethylidene)-1,4-phenylene] (9CI) (CA INDEX NAME)



IC ICM H01M008-02

ICS B01D071-68; C08G075-23; C08J005-22; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **fuel cell** sulfonated polysulfone electrolyte membrane

IT **Fuel cell** electrolytes

(structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

IT Polysulfones, uses

(sulfonated; structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

IT 196301-55-0

(structure and manuf. of arom. polymer electrolyte membranes and their manuf. for **fuel cells**)

(FORMULA 3)

=> D L36 1-4 BIB ABS HITSTR HITIND

L36 ANSWER 1 OF 4 HCA COPYRIGHT 2007 ACS on STN

AN 141:40719 HCA Full-text

TI Method for producing membrane-**electrode** structure for

polymer electrolyte **fuel cell**
 IN Tani, Masaki; Shinkai, Hiroshi; Kohyama, Katsuhiko; Tanaka, Ichiro;
 Hama, Yuichiro; Yano, Junichi
 PA Honda Motor Co., Ltd., Japan
 SO U.S. Pat. Appl. Publ., 23 pp.
 CODEN: USXXCO
 DT Patent
 LA English
 FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE | |
|------|--|------|----------|-----------------|--------------|--|
| PI | US 2004115499 | A1 | 20040617 | US 2003-721505 | 200311 26 | |
| | | | | <-- | | |
| | US 7306876 | B2 | 20071211 | | | |
| | JP 2004193109 | A | 20040708 | JP 2003-371048 | 200310 30 | |
| | | | | <-- | | |
| | JP 2004221056 | A | 20040805 | JP 2003-371049 | 200310 30 | |
| | | | | <-- | | |
| | JP 2004214173 | A | 20040729 | JP 2003-371836 | 200310 31 | |
| | | | | <-- | | |
| PRAI | JP 2002-347580 | A | 20021129 | <-- | | |
| | JP 2002-366037 | A | 20021218 | <-- | | |
| | JP 2002-379820 | A | 20021227 | <-- | | |
| | JP 2003-371048 | A | 20031030 | | | |
| | JP 2003-371049 | A | 20031030 | | | |
| | JP 2003-371836 | A | 20031031 | | | |
| AB | The present invention provides a method for producing a membrane-electrode structure having an excellent adhesiveness between an electrode catalyst layer and a diffusion electrode, and a polymer electrolyte fuel cell using a membrane-electrode structure obtained by the prodn. method. Moreover, it also provides an elec. app. and a transport machine that use the above polymer electrolyte fuel cell. A catalyst past comprising a catalyst supported by an electron conducting material and an ion conducting material is applied on a sheet substrate, and it is then dried, so as to form electrode catalyst layers. The electrode catalyst layers are thermally transferred onto each side of a polymer electrolyte membrane, so as to form a laminated body. A first slurry comprising a water- | | | | | |

repellent material and an electron conducting material is applied on a carbon substrate layer, and it is dried to form a water-repellent layer, and then, a second slurry comprising an electron conducting material and an ion conducting material is applied on the water-repellent layer, and it is dried to form a hydrophilic layer, so that a diffusion **electrode** is formed. The previously formed diffusion **electrode** is laminated on the **electrode catalyst** layer through the hydrophilic layer, and they are then pressed under heating, so as to integrate the laminated body and the diffusion **electrode**.

IT 122325-09-1DP, reaction products with derivatized benzophenones, **sulfonated**

(method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

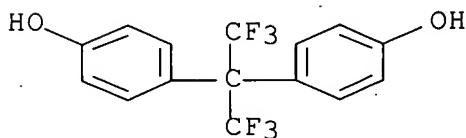
RN 122325-09-1 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (CA INDEX NAME)

CM 1

CRN 1478-61-1

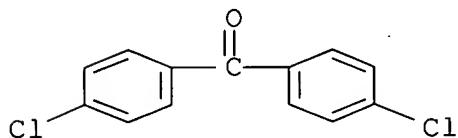
CMF C15 H10 F6 O2



CM 2

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M008-10

ICS H01M004-88; H01M004-96; B05D005-12

INCL 429030000; 427115000; 502101000; 429044000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST membrane **electrode** structure fabrication polymer
electrolyte **fuel cell**

IT **Catalysts**
(electrocatalysts; method for producing membrane-
electrode structure for polymer electrolyte **fuel**
cell)

IT Polyoxyalkylenes, uses
(fluorine- and sulfo-contg., ionomers; method for producing
membrane-**electrode** structure for polymer electrolyte **fuel**
cell)

IT Electric apparatus
Fuel cell electrodes
Fuel cell electrolytes
(method for producing membrane-**electrode** structure for
polymer electrolyte **fuel cell**)

IT Fluoropolymers, uses
(method for producing membrane-**electrode** structure for
polymer electrolyte **fuel cell**)

IT Polyketones
(polyarylene-polyether-, sulfonated; method for producing
membrane-**electrode** structure for polymer electrolyte
fuel cell)

IT Polysulfones, uses
(polyarylene-polyether-; method for producing membrane-
electrode structure for polymer electrolyte **fuel**
cell)

IT Polyethers, uses
(polyarylene-polyketone-, sulfonated; method for producing
membrane-**electrode** structure for polymer electrolyte **fuel**
cell)

IT Polyethers, uses
(polyarylene-polysulfone-; method for producing membrane-
electrode structure for polymer electrolyte **fuel**
cell)

IT Polyphenyls
(polyketone-, fluorine-contg.; method for producing membrane-
electrode structure for polymer electrolyte **fuel**
cell)

IT Polyphenyls
(polyketone-, sulfonated; method for producing membrane-
electrode structure for polymer electrolyte **fuel**
cell)

IT Fluoropolymers, uses
(polyketone-polyphenyl-; method for producing membrane-
electrode structure for polymer electrolyte **fuel**

cell)

IT Fuel cells
(polymer electrolyte; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Fluoropolymers, uses
(polyoxyalkylene-, sulfo-contg., ionomers; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Ionomers
(polyoxyalkylenes, fluorine- and sulfo-contg.; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyketones
(polyphenyl-, fluorine-contg.; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Polyketones
(polyphenyl-, sulfonated; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Carbon fibers, uses
(pore formers; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Carbon black, uses
(support; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT Machinery
(transport; method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 7440-06-4, Platinum, uses 37258-14-3
(method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 122325-09-1DP, reaction products with derivatized benzophenones, **sulfonated** 463954-50-9DP, reaction product with bisphenol AF and derivatized benzophenone oligomer, sulfonated 701909-66-2DP, reaction product with bisphenol AF and derivatized benzophenone oligomer, sulfonated
(method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 9002-84-0, Ptfe
(method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 122325-09-1P
(method for producing membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 7440-44-0, Carbon, uses

(substrate; method for producing membrane-**electrode**
structure for polymer electrolyte **fuel cell**)

L36 ANSWER 2 OF 4 HCA COPYRIGHT 2007 ACS on STN
AN 141:40691 HCA Full-text
TI Membrane-**electrode** structure for polymer electrolyte
fuel cell
IN Fukuda, Kaoru; Tanaka, Ichiro; Tani, Masaki; Matsuo, Junji
PA Honda Motor Co., Ltd., Japan
SO Eur. Pat. Appl., 26 pp.
CODEN: EPXXDW

DT Patent
LA English

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---|------|----------|-----------------|--------------|
| PI | EP 1429403 | A2 | 20040616 | EP 2003-26936 | 200311 25 |
| | | | | | <-- |
| | R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK | | | | |
| | JP 2004193106 | A | 20040708 | JP 2003-360615 | 200310 21 |
| | | | | | <-- |
| | US 2004115502 | A1 | 20040617 | US 2003-720280 | 200311 25 |
| | | | | | <-- |

PRAI JP 2002-341362 A 20021125 <--
JP 2003-360615 A 20031021

AB A membrane-**electrode** structure capable of exhibiting excellent elec. power generation performance even in a high current region and a polymer electrolyte **fuel cell** using the membrane-**electrode** structure are provided. Addnl., elec. appliances and transport machines each using the above-described polymer electrolyte **fuel cell** are provided. The membrane-**electrode** structure comprises an **anode**, a **cathode** and a polymer electrolyte membrane made of a sulfonated polyarylene based polymer and held between both **electrodes**. The **cathode** comprises an **electrode catalyst** layer contg. a **catalyst** particle having the **catalyst** loaded on the carbon particles, a pore forming member and an ion conducting polymer falling within the wt. ratio range from 1.0 to 1.8 in relation to the carbon particles, and is in contact with the polymer electrolyte membrane through the **electrode catalyst** layer.

The **electrode catalyst** layer has a total sum vol. of the pores falling within the pore diam. range from 0.01 to 30 μm , of the pores formed by the pore forming member, equal to or more than 6.0 $\mu\text{L}/\text{cm}^2\text{-mg catalyst}$. The pores formed by the pore forming member have a first peak falling within the pore diam. range from 0.01 to 0.1 μm and a second peak falling within the pore diam. range from 0.1 to 1.0 μm .

IT 122325-09-1DP, reaction products with phenoxy derivatized benzophenone, **sulfonated** (membrane-**electrode** structure for polymer electrolyte **fuel cell**)

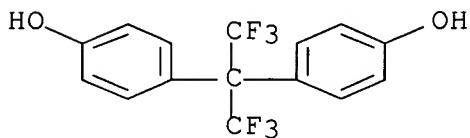
RN 122325-09-1 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylidene)bis[phenol] (CA INDEX NAME)

CM 1

CRN 1478-61-1

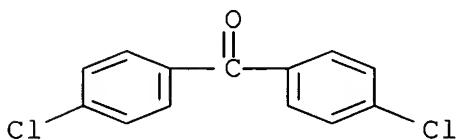
CMF C15 H10 F6 O2



CM 2

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M004-86

ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST polymer electrolyte **fuel cell** membrane

- IT **electrode structure**
- IT **Catalysts**
 - (electrocatalysts; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Polyoxyalkylenes, uses**
 - (fluorine- and sulfo-contg., ionomers; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Electric apparatus**
 - Fuel cell electrodes**
 - Fuel cell** electrolytes
 - (membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Carbon black, uses**
 - (membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Polyketones**
 - (polyarylene-polyether-, sulfonated; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Polysulfones, uses**
 - (polyarylene-polyether-; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Polyethers, uses**
 - (polyarylene-polyketone-, sulfonated; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Polyethers, uses**
 - (polyarylene-polysulfone-; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Fuel cells**
 - (polymer electrolyte; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Fluoropolymers, uses**
 - (polyoxyalkylene-, sulfo-contg., ionomers; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Ionomers**
 - (polyoxyalkylenes, fluorine- and sulfo-contg.; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **Machinery**
 - (transport; membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **12613-88-6**
 - (membrane-**electrode** structure for polymer electrolyte **fuel cell**)
- IT **7440-44-0, Carbon, uses**
 - (membrane-**electrode** structure for polymer electrolyte **fuel cell**)

IT 582300-03-6, Nafion SE20192
 (membrane-**electrode** structure for polymer electrolyte
fuel cell)

IT 122325-09-1DP, reaction products with phenoxy derivatized
 benzophenone, **sulfonated** 463954-50-9DP, reaction
 products bisphenol AF benzophenone oligomer, sulfonated
 (membrane-**electrode** structure for polymer electrolyte
fuel cell)

IT 122325-09-1P
 (membrane-**electrode** structure for polymer electrolyte
fuel cell)

L36 ANSWER 3 OF 4 HCA COPYRIGHT 2007 ACS on STN
 AN 140:409652 HCA Full-text
 TI Method of fabrication of **electrode** structure for polymer
 electrolyte **fuel cell**
 IN Hama, Yuichiro; Iguchi, Masaru; Yano, Junichi; Kanaoka, Nagayuki;
 Mitsuta, Naoki
 PA Honda Motor Co., Ltd, Japan
 SO U.S. Pat. Appl. Publ., 17 pp.
 CODEN: USXXCO

DT Patent
 LA English

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------|----------------|------|----------|-----------------|--------------|
| PI | US 2004096731 | A1 | 20040520 | US 2003-713146 | 200311 17 |
| | | | | <-- | |
| | JP 2004186142 | A | 20040702 | JP 2003-371834 | 200310 31 |
| | | | | <-- | |
| | JP 2004186143 | A | 20040702 | JP 2003-371835 | 200310 31 |
| | | | | <-- | |
| | US 2007166594 | A1 | 20070719 | US 2007-723436 | 200703 20 |
| | | | | <-- | |
| PRAI | JP 2002-333566 | A | 20021118 | <-- | |
| | JP 2002-334302 | A | 20021118 | <-- | |
| | JP 2003-371834 | A | 20031031 | | |
| | JP 2003-371835 | A | 20031031 | | |

US 2003-713146 A3 20031117

AB There is provided an **electrode** structure for a polymer electrolyte **fuel cell** having excellent power generation performance and excellent durability and a method for manufg. the same. Also provided is a polymer electrolyte **fuel cell** including the **electrode** structure and an elec. app. and a transport app. using the polymer electrolyte **fuel cell**. The **electrode** structure includes a polymer electrolyte membrane sandwiched between a pair of **electrode catalyst** layers contg. carbon particles supporting **catalyst** particles. The polymer electrolyte membrane is made of a sulfonated polyarylene-based polymer. The sulfonated polyarylene-based polymer has an ion exchange capacity in the range of 1.7 to 2.3 meq/g, and the polymer contains a component insol. in N-methylpyrrolidone in an amt. of 70% or less relative to the total amt. of the polymer, after the polymer is subjected to heat treatment for exposing it under a const. temp. atm. of 120° for 200 h. A **catalyst** paste contg. **catalyst** particles and a polymer electrolyte is coated on a sheet-like support and dried to form an **electrode catalyst** layer contg. a solvent in an amt. in the range of 0.5% or less by wt. of the total membrane. The **electrode catalyst** layers are thermally transferred and joined on both sides of the polymer electrolyte membrane.

IT 690268-39-4DP, **sulfonated**

(method of fabrication of **electrode** structure for polymer electrolyte **fuel cell**)

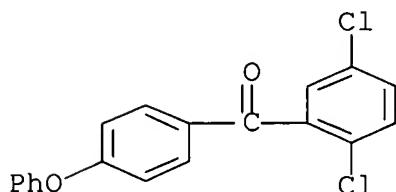
RN 690268-39-4 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)(4-phenoxyphenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

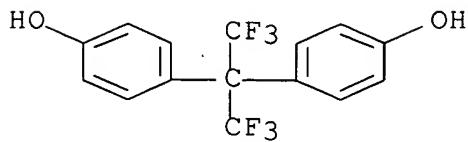
CRN 151173-25-0

CMF C19 H12 Cl2 O2



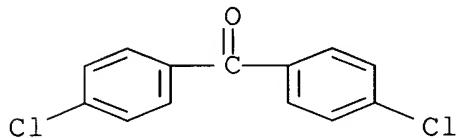
CM 2

CRN 1478-61-1
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2
CMF C13 H8 Cl2 O



IC ICM H01M004-96
ICS H01M008-10; H01M004-88; B05D005-12
INCL 429044000; 429033000; 427115000; 502101000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **electrode** structure polymer electrolyte **fuel**
cell
IT **Catalysts**
(electrocatalysts; method of fabrication of **electrode**
structure for polymer electrolyte **fuel cell**)
IT **Fuel cell electrodes**
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT Carbon black, uses
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT Fluoropolymers, uses
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT Polyesters, uses
(method of fabrication of **electrode** structure for

polymer electrolyte **fuel cell**)
IT **Fuel cells**
(solid electrolyte; method of fabrication of **electrode**
structure for polymer electrolyte **fuel cell**)
IT 7440-06-4, Platinum, uses
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT 690268-39-4DP, sulfonated 690268-39-4P
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT 9002-84-0, Ptfe
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT 122325-09-1P
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT 25038-59-9, Polyethylene terephthalate, uses
(method of fabrication of **electrode** structure for
polymer electrolyte **fuel cell**)
IT 7440-44-0, Carbon, uses
(support; method of fabrication of **electrode** structure
for polymer electrolyte **fuel cell**)

L36 ANSWER 4 OF 4 HCA COPYRIGHT 2007 ACS on STN
AN 140:409627 HCA Full-text
TI **Electrode** structure for polymer electrolyte **fuel**
cells
IN Sohma, Hiroshi; Iguchi, Masaru; Kanaoka, Nagayuki; Kaji, Hayato;
Morikawa, Hiroshi; Mitsuta, Naoki
PA Honda Motor Co., Ltd., Japan
SO Eur. Pat. Appl., 26 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|--|----------|-----------------|--------------|
| PI | EP 1420473 | A1 | 20040519 | EP 2003-26194 | 200311 17 |
| | | | | | <-- |
| | EP 1420473 | B1 | 20060412 | | |
| | R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK | | | |
| | US 2004197632 | A1 | 20041007 | US 2003-714394 | |

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JP 2005158265

A

20050616

JP 2003-387362

200311

18

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PRAI JP 2002-333143

A

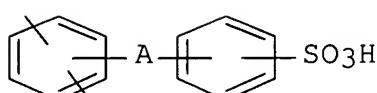
20021118 <--

JP 2003-371047

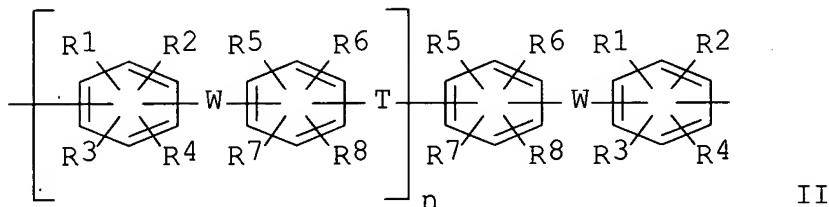
A

20031030

GI



I



II

AB The present invention provides an **electrode** structure for polymer electrolyte **fuel cells**, inexpensive, and exhibiting excellent power prodn. capacity and durability even under high temp./low humidity conditions, and also provides a polymer electrolyte **fuel cell** which incorporates the same **electrode** structure. The present invention also provides an elec. device and transportation device, each incorporating the same polymer electrolyte **fuel cell**. The **electrode** structure comprises a pair of **electrode catalyst** layers, each contg. a **catalyst** supported by carbon particles, and polymer electrolyte membrane placed between these **electrode catalyst** layers. The polymer electrolyte membrane is of a sulfonated polyarylene composed of 0.5 to 100% by mol of the first repeating unit represented by (I) and 0 to 99.5% by mol of the second repeating unit represented by (II): (wherein, A is a divalent org. group; and a benzene ring includes its deriv.; -W- is a divalent electron attracting group; - T- is a divalent org. group; and R1 to R8 are a hydrogen atom or fluorine

atom, an alkyl group, fluorine-substituted alkyl group, allyl group, aryl group or cyano group, and may be the same or different).

IT 690247-89-3D, ester hydrolysis products

(electrode structure for polymer electrolyte
fuel cells)

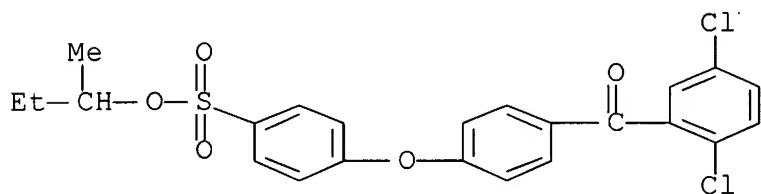
RN 690247-89-3 HCA

CN Benzenesulfonic acid, 4-[4-(2,5-dichlorobenzoyl)phenoxy]-, 1-methylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol], block (9CI) (CA INDEX NAME)

CM 1

CRN 690247-88-2

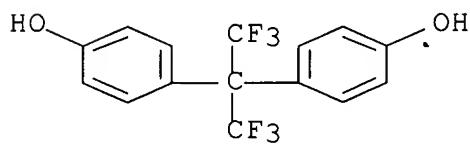
CMF C23 H20 Cl12 O5 S



CM 2

CRN 1478-61-1

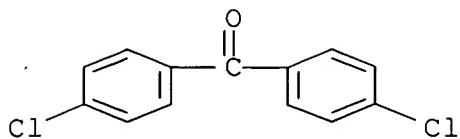
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl12 O



(**electrode** structure for polymer electrolyte
fuel cells)

IC ICM H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST **electrode** structure polymer electrolyte **fuel**
cell

IT **Catalysts**

(electrocatalysts; **electrode** structure for polymer
electrolyte **fuel cells**)

IT **Fuel cell electrodes**

(**electrode** structure for polymer electrolyte
fuel cells)

IT Noble metals

(**electrode** structure for polymer electrolyte
fuel cells)

IT Fluoropolymers, uses

(**electrode** structure for polymer electrolyte
fuel cells)

IT Polyoxyalkylenes, uses

(fluorine- and sulfo-contg., ionomers; **electrode**
structure for polymer electrolyte **fuel cells**)

IT Fluoropolymers, uses

(polyoxyalkylene-, sulfo-contg., ionomers; **electrode**
structure for polymer electrolyte **fuel cells**)

IT Ionomers

(polyoxyalkylenes, fluorine- and sulfo-contg.; **electrode**
structure for polymer electrolyte **fuel cells**)

IT **Fuel cells**

(solid electrolyte; **electrode** structure for polymer
electrolyte **fuel cells**)

IT 7440-06-4, Platinum, uses

(**electrode** structure for polymer electrolyte
fuel cells)

IT 690247-89-3D, ester hydrolysis products

(**electrode** structure for polymer electrolyte
fuel cells)

IT 9002-84-0, Ptfe

(**electrode** structure for polymer electrolyte

fuel cells)

IT 122325-09-1P 663920-23-8P, Benzenesulfonic acid,
4-[4-(2,5-dichlorobenzoyl)phenoxy]-, sodium salt 663920-24-9P,
4-[4-(2,5-Dichlorobenzoyl)phenoxy]benzenesulfonyl chloride
690247-88-2P **690247-89-3P**

(electrode structure for polymer electrolyte
fuel cells)

IT 7440-44-0, Carbon, uses
(support; electrode structure for polymer electrolyte
fuel cells)

=> D L38 1-6 BIB ABS HITSTR HITIND

L38 ANSWER 1 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 141:54792 HCA Full-text

TI Aromatic sulfonate derivative, polyarylene, sulfonated polyarylene
and production method thereof, macromolecular solid electrolyte, and
proton conductive membrane

IN Kanaoka, Nagayuki; Iguchi, Masaru; Mitsuta, Naoki; Soma, Hiroshi;
Ohtsuki, Toshihiro

PA JSR Corporation, Japan; Honda Motor Co., Ltd.

SO Eur. Pat. Appl., 19 pp.

CODEN: EPXXDW

DT Patent

LA English

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|--|----------|-----------------|--------------|
| PI | EP 1431281 | A1 | 20040623 | EP 2003-28999 | 200312 17 |
| | | | | | <-- |
| | EP 1431281 | B1 | 20060510 | | |
| | R: | AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK | | | |
| | JP 2004196947 | A | 20040715 | JP 2002-367042 | 200212 18 |
| | | | | | <-- |
| | JP 3939244 | B2 | 20070704 | | |
| | US 2004126639 | A1 | 20040701 | US 2003-734194 | 200312 15 |
| | | | | | <-- |

US 7078121 B2 20060718
PRAI JP 2002-367042 A 20021218 <--
OS MARPAT 141:54792

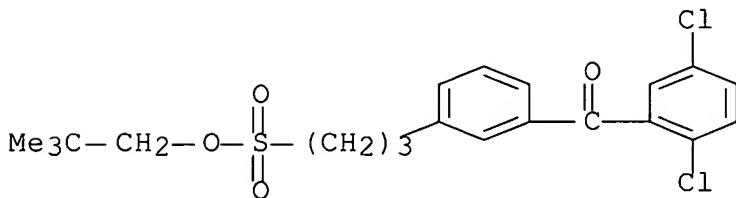
AB Described herein is a prodn. method of sulfonated polyarylene that is safe and enables easy control of the amt. and position of sulfonic groups introduced in the polymer. The sulfonated polyarylene is also disclosed. The invention further provides a polyarylene and an arom. sulfonate deriv. that are suitably employed in the above prodn. method. Also provided are a macromol. solid electrolyte that comprises the sulfonated polyarylene, and a proton conductive membrane. The arom. sulfonate deriv. has the formula $X_2C_6H_3YC_6H_4ASO_2R$, wherein X is a halogen atom other than fluorine, a $-OSO_3CH_3$ group or a $-OSO_3CF_3$ group; Y is a divalent org. group; A is $-(CH_2)_m-$ or $-(CF_2)_m-$ (wherein m is an integer of 1 to 10); and R is a C4-20 hydrocarbon group. The prodn. method of sulfonated polyarylene comprises coupling polymn. of an arom. compd. that includes at least the arom. sulfonate deriv. and hydrolysis of the resultant polyarylene.

IT 705967-34-6P
(arom. sulfonate deriv., polyarylene, sulfonated polyarylene and prodn. method thereof, macromol. solid electrolyte, and proton conductive membrane)

RN 705967-34-6 HCA
CN Benzenepropanesulfonic acid, 3-(2,5-dichlorobenzoyl)-, 2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

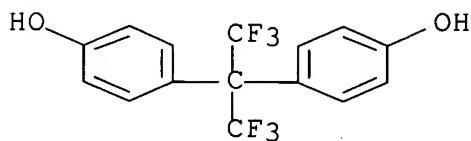
CRN 705967-33-5
CMF C21 H24 Cl2 O4 S



CM 2

CRN 1478-61-1

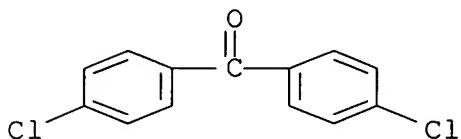
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IT 705967-34-6DP, hydrolyzed

(arom. sulfonate deriv., polyarylene,
sulfonated polyarylene and prodn. method thereof,
macromol. solid electrolyte, and proton conductive membrane)

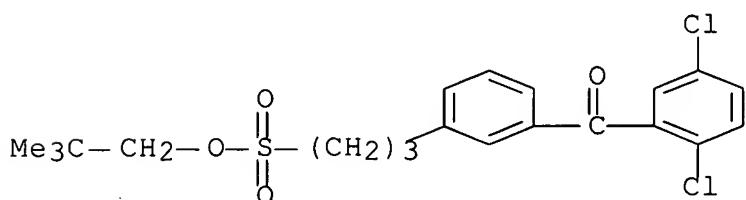
RN 705967-34-6 HCA

CN Benzenepropanesulfonic acid, 3-(2,5-dichlorobenzoyl)-,
2,2-dimethylpropyl ester, polymer with bis(4-chlorophenyl)methanone
and 4,4'-(2,2,2-trifluoro-1-(trifluoromethyl)ethylidene)bis[phenol]
(9CI) (CA INDEX NAME)

CM 1

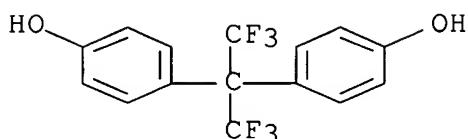
CRN 705967-33-5

CMF C21 H24 Cl2 O4 S



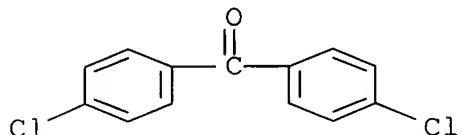
CM 2

CRN 1478-61-1
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2
CMF C13 H8 Cl2 O



IC ICM C07C309-67
ICS C08G061-10; C08G061-12; H01M010-40
CC 35-2 (Chemistry of Synthetic High Polymers)
Section cross-reference(s): 52
ST arom sulfonate polymer proton conductive membrane **fuel cell**
IT **Fuel cells**
Hydrolysis
Polymer electrolytes
(arom. sulfonate deriv., polyarylene, sulfonated polyarylene and
prodn. method thereof, macromol. solid electrolyte, and proton
conductive membrane)
IT **705967-34-6P**
(arom. sulfonate deriv., polyarylene, sulfonated polyarylene and
prodn. method thereof, macromol. solid electrolyte, and proton
conductive membrane)
IT **705967-34-6DP**, hydrolyzed
(arom. **sulfonate** deriv., polyarylene,

**sulfonated polyarylene and prodn. method thereof,
macromol. solid electrolyte, and proton conductive membrane)**

RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L38 ANSWER 2 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 139:367516 HCA Full-text

TI Varnish composition for **fuel cell** electrodes.

IN Higami, Makoto; Goto, Kohei; Kanaoka, Osayuki; Takahashi, Ryoichiro;
Asano, Yoichi; Kakutani, Osamu; Okiyama, Hajime

PA JSR Ltd., Japan; Honda Motor Co., Ltd.

SO Jpn. Kokai Tokkyo Koho, 17 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 3

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------|------|------|-----------------|------|
|------------|------|------|-----------------|------|

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|------------------|---|----------|----------------|--|
| PI JP 2003317749 | A | 20031107 | JP 2002-122822 | |
|------------------|---|----------|----------------|--|

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24

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|-------------|----|----------|------------------|--|
| JP 3994024 | B2 | 20071017 | | |
| DE 10318398 | A1 | 20031204 | DE 2003-10318398 | |

200304
23

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|---------------|----|----------|----------------|--|
| US 2004028806 | A1 | 20040212 | US 2003-420968 | |
|---------------|----|----------|----------------|--|

200304
23

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|---------------|----|----------|----------------|--|
| US 2006269655 | A1 | 20061130 | US 2006-498173 | |
|---------------|----|----------|----------------|--|

200608
03

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PRAI JP 2002-122822 A 20020424 <--
JP 2002-122823 A 20020424 <--
JP 2002-122824 A 20020424 <--
US 2003-420968 A3 20030423

AB The disclosed varnish compn. comprises sulfonated polymer, water, an org. solvent which is as good solvent for the polymer, and another solvent whose b. p. is $\geq 50^\circ$ but lower than that of the good solvent. The varnish compn. gives uniform proton-conductive membranes on the **fuel cell** electrodes.

IT **463963-71-5D, sulfonated**

(mixed solvents for **sulfonated** polymer varnish for

fuel cell proton-conductive membranes)

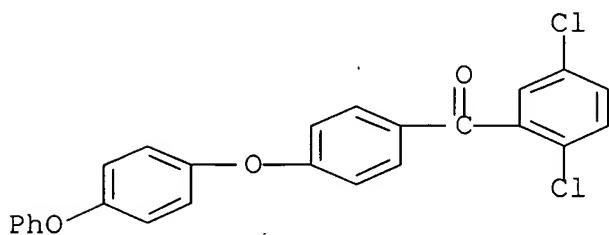
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

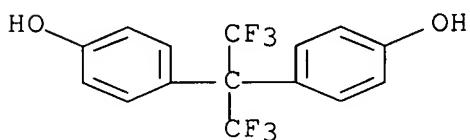
CMF C25 H16 Cl2 O3



CM 2

CRN 1478-61-1

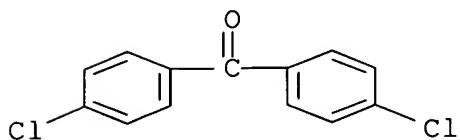
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM H01M008-02
ICS H01M008-10
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 42
ST solvent mixt sulfonated polymer varnish **fuel cell**
electrode
IT Varnishes
(for formation of sulfonated polymer type proton conductive
membranes for **fuel cells**)
IT Solvents
(for varnishes for forming proton-conductive membranes on
fuel cell electrode)
IT **Fuel cell** electrodes
(solvent mixt. for varnishes for forming proton-conductive
membranes on)
IT 78-93-3, Methyl ethyl ketone, uses 109-99-9, Tetrahydrofuran, uses
110-71-4 872-50-4, N-Methyl-2-pyrrolidone, uses 7732-18-5,
Water, uses
(mixed solvents for sulfonated polymer varnish for **fuel**
cell proton-conductive membranes)
IT **463963-71-5D, sulfonated**
(mixed solvents for **sulfonated** polymer varnish for
fuel cell proton-conductive membranes)

L38 ANSWER 3 OF 6 HCA COPYRIGHT 2007 ACS on STN
AN 139:340077 HCA Full-text
TI Manufacture of multilayer structures suitable for **fuel**
cells
IN Higami, Makoto; Goto, Kohei; Kanaoka, Osayuki; Takahashi, Ryoichiro;
Asano, Yoichi; Kakutani, Osamu; Okiyama, Hajime
PA JSR Ltd., Japan; Honda Motor Co., Ltd.
SO Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 3

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|----|---------------|------|----------|------------------|--------|
| PI | JP 2003317739 | A | 20031107 | JP 2002-122823 | 200204 |
| | | | | | 24 |
| | | | | <-- | |
| | JP 3822130 | B2 | 20060913 | | |
| | DE 10318398 | A1 | 20031204 | DE 2003-10318398 | |

200304
23

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US 2004028806 A1 20040212 US 2003-420968 200304
23

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US 2006269655 A1 20061130 US 2006-498173 200608
03

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PRAI JP 2002-122822 A 20020424 <--
JP 2002-122823 A 20020424 <--
JP 2002-122824 A 20020424 <--
US 2003-420968 A3 20030423

AB Aq. dispersions contg. 0.5-20 wt.% perfluorosulfonic acid polymers are applied on an electrode layer, and sulfonated polyarylene solns. are applied on the resulting perfluorosulfonic acid polymer layer to give the multilayer structures. The perfluorosulfonic acid polymer layer prevents penetration of the sulfonated polyarylene layer into the electrode layer to provide membrane-electrode assemblies for **fuel cells** with high power generation performance.

IT 463963-71-5D, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, **sulfonated**
(manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

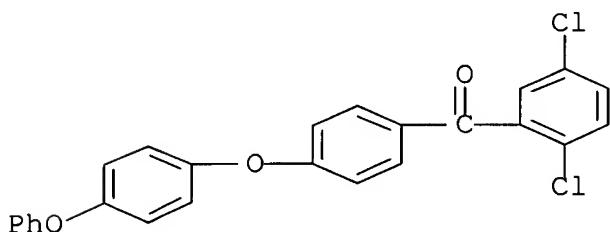
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

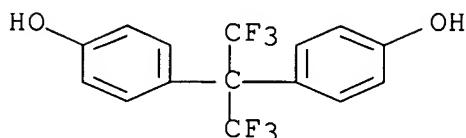
CRN 463954-50-9

CMF C25 H16 Cl2 O3



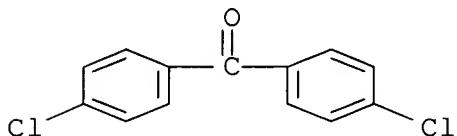
CM 2

CRN 1478-61-1
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2
CMF C13 H8 Cl2 O



IC ICM H01M008-02
ICS H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST perfluorosulfonate polymer sulfonated polyarylene **fuel cell**; membrane electrode **fuel cell**
sulfonated polyarylene

IT Conducting polymers
(ionic; manuf. of multilayer membrane-electrode assemblies for
fuel cells)

IT Coating process
Fuel cell electrodes
Fuel cell electrolytes
Polymer electrolytes
(manuf. of multilayer membrane-electrode assemblies for
fuel cells)

IT Sulfonic acids, uses
(perfluorosulfonic acid polymers; manuf. of multilayer

membrane-electrode assemblies for **fuel cells**)
IT Polyketones
(polyether-, arom., fluorine-contg., sulfonated; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT Fluoropolymers, uses
(polyether-polyketone-, arom., sulfonated; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT Polyethers, uses
(polyketone-, arom., fluorine-contg., sulfonated; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT Ionic conductors
(polymeric; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT **Fuel cells**
(solid electrolyte; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT Coating process
(spray; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT Fluoropolymers, uses
(sulfo-contg., perfluoro; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT Fluoropolymers, uses
(sulfo-contg.; manuf. of multilayer membrane-electrode assemblies for **fuel cells**)
IT 66796-30-3, Nafion 117 **463963-71-5D**, Bisphenol AF-4, 4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, **sulfonated**
(manuf. of multilayer membrane-electrode assemblies for **fuel cells**)

L38 ANSWER 4 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 139:119897 HCA Full-text

TI Polymer electrolyte composition and proton-conductive membrane for **fuel cell**

IN Okaniwa, Motoki; Goto, Kohei

PA JSR Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 21 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

PATENT NO.

KIND

DATE

APPLICATION NO.

DATE

PI JP 2003201403

A 20030718

JP 2002-2793

200201
09

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PRAI JP 2002-2793

20020109 <--

AB The compn. contains a polymer electrolyte and an antioxidant contg. (a) ≥ 1 compd. selected from a phenolic OH-contg. compd. and an amine and (b) an org. P or org. S compd. except the phenols or amines. The proton-conductive membrane is that made of the compn. showing enhancement of resistance to oxidn. by H₂O₂ radical (generated in **fuel cells**) without affecting proton cond. and mech. strength.

IT **463963-71-5DP, sulfonated**

(polymer electrolyte compn. contg. antioxidant for proton-conductive membrane in **fuel cell**)

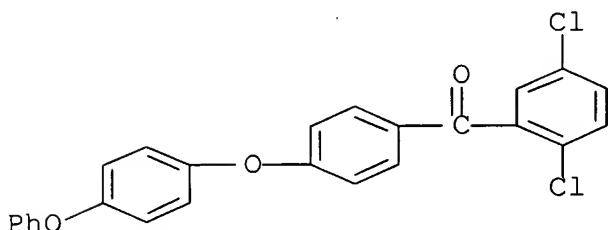
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 463954-50-9

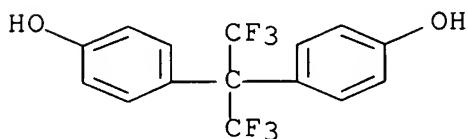
CMF C25 H16 Cl2 O3



CM 2

CRN 1478-61-1

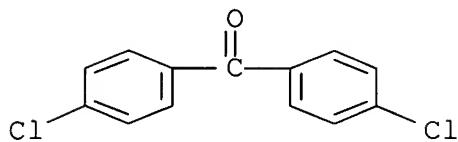
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2

CMF C13 H8 Cl2 O



IC ICM C08L101-00

ICS C08G065-12; C08K005-13; C08K005-17; C08K005-36; C08K005-49;
C08L071-00; C25B013-08; H01M008-02; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST polymer electrolyte compn proton conductive membrane; antioxidant
phenol amine org phosphorus compd; sulfur compd antioxidant polymer
electrolyte; radical resistance polymer electrolyte **fuel
cell**

IT Polyketones

(polyether-, fluorine-contg.; polymer electrolyte compn. contg.
antioxidant for proton-conductive membrane in **fuel
cell**)

IT Fluoropolymers, uses

(polyether-polyketone-; polymer electrolyte compn. contg.
antioxidant for proton-conductive membrane in **fuel
cell**)

IT Polyethers, uses

(polyketone-, fluorine-contg.; polymer electrolyte compn. contg.
antioxidant for proton-conductive membrane in **fuel
cell**)

IT Antioxidants

Fuel cells

Polymer electrolytes

(polymer electrolyte compn. contg. antioxidant for
proton-conductive membrane in **fuel cell**)

IT Ionic conductors

(protonic; polymer electrolyte compn. contg. antioxidant for
proton-conductive membrane in **fuel cell**)

IT 364062-39-5DP, 4,4'-Dichlorobenzophenone-2,5-Dichloro-4'-
phenoxybenzophenone copolymer, sulfonated **463963-71-5DP**,

sulfonated

(polymer electrolyte compn. contg. antioxidant for proton-conductive membrane in **fuel cell**)

IT 693-36-7, Distearyl-3,3'-thiodipropionate 1455-42-1D,
3,9-Bis(2-hydroxy-1,1-dimethylethyl)-2,4,8,10-tetraoxaspiro[5.5]undecane, ester mixt. 1703-58-8D,
1,2,3,4-Butanetetracarboxylic acid, ester mixt. 1709-70-2,
1,3,5-Trimethyl-2,4,6-tris[3,5-di(tert-butyl)-4-hydroxybenzyl]benzene 2403-89-6D, 1,2,2,6,6-Pentamethyl-4-piperidinol, ester mixt. 6683-19-8, Pentaerythrityl tetrakis[3-[3,5-di(tert-butyl)-4-hydroxyphenyl]propionate]
27676-62-6, Tris[3,5-di(tert-butyl)-4-hydroxybenzyl] isocyanurate
29598-76-3 80693-00-1, Bis[2,6-di(tert-butyl)-4-methylphenyl]pentaerythritol diphosphite 561307-00-4
(polymer electrolyte compn. contg. antioxidant for proton-conductive membrane in **fuel cell**)

L38 ANSWER 5 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 139:77168 HCA Full-text

TI Sulfonated polyarylene composition and proton-conductive membrane

IN Okaniwa, Motoki; Goto, Kohei

PA JSR Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 13 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| | PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|-------|---------------|-------|----------|-----------------|----------|
| ----- | ----- | ----- | ----- | ----- | ----- |
| ----- | ----- | ----- | ----- | ----- | ----- |
| PI | JP 2003183526 | A | 20030703 | JP 2001-391748 | 20011225 |

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PRAI JP 2001-391748 20011225 <--

AB The compn. contains a sulfonated polyarylene, a hindered phenol with mol. wt. \geq 500, and a hindered amine with mol. wt. \geq 500. The proton-conductive membrane, useful as a solid electrolyte in a **fuel cell**, etc., is made of the compn. showing resistance to oxidn. and mech. strength.

IT **463963-71-5DP**, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, **sulfonated**

(**sulfonated** polyarylene compn. contg. hindered phenol and hindered amine antioxidants for proton-conductive membrane)

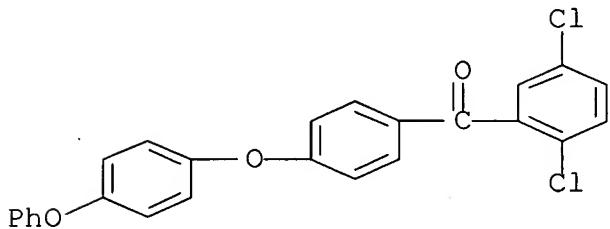
RN 463963-71-5 HCA

CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-

(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

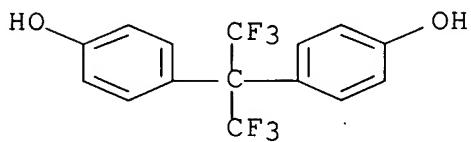
CM 1

CRN 463954-50-9
CMF C25 H16 Cl2 O3



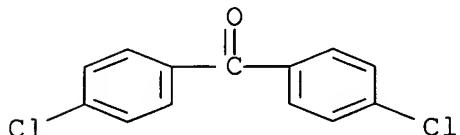
CM 2

CRN 1478-61-1
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2
CMF C13 H8 Cl2 O



IC ICM C08L101-06

ICS C08K005-13; C08K005-3435; H01B001-06; H01M008-02
CC 76-2 (Electric Phenomena)
Section cross-reference(s): 38
IT 7664-93-9DP, Sulfuric acid, polyarylene sulfonate with
364062-39-5DP, 4,4'-Dichlorobenzophenone-2,5-dichloro-4'-
phenoxybenzophenone copolymer, sulfonated **463963-71-5DP**,
Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-
phenoxy)phenoxybenzophenone copolymer, **sulfonated**
(**sulfonated** polyarylene compn. contg. hindered phenol
and hindered amine antioxidants for proton-conductive membrane)

L38 ANSWER 6 OF 6 HCA COPYRIGHT 2007 ACS on STN

AN 138:239119 HCA Full-text

TI Crosslinked polymer electrolytes with high proton conductivity and
durability and their manufacture

IN Okaniwa, Motoki; Goto, Kohei

PA JSR Ltd., Japan

SO Jpn. Kokai Tokkyo Koho, 19 pp.

CODEN: JKXXAF

DT Patent

LA Japanese

FAN.CNT 1

| PATENT NO. | KIND | DATE | APPLICATION NO. | DATE |
|------------|------|-------|-----------------|-------|
| ----- | --- | ----- | ----- | ----- |
| ----- | --- | ----- | ----- | ----- |

PI JP 2003082012 A 20030319 JP 2001-275421

200109
11

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PRAI JP 2001-275421 20010911 <--

AB The polymer electrolytes for **fuel cell** proton-conductive membranes,
battery electrolytes, displays, sensors, capacitors, ion-exchange
membranes, etc., are manufd. by polymg. monomers having ≥ 2 radical-
polymerizable groups in the presence of proton-conductive polymers
and have insol. to N-methylpyrrolidone $\geq 40\%$. Thus, bisphenol AF-
4,4'-dichlorobenzophenone oligomer was reacted with 2,5-dichloro-4'-
(4-phenoxy)phenoxybenzophenone to give a copolymer, which was reacted
with H₂SO₄. A mixt. contg. the sulfonated polymer and Kayarad DPHA
(dipentaerythritol hexaacrylate-dipentaerythritol pentaacrylate
mixt.) was processed to give a crosslinked polymer film showing high
proton cond. and tensile strength.

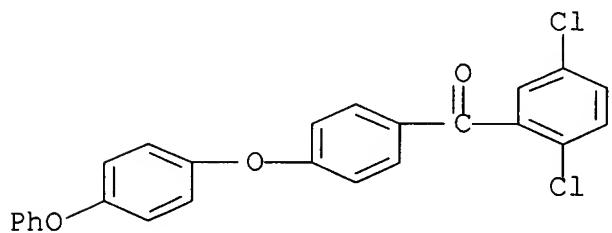
IT **463963-71-5DP**, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-
dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer,
sulfonated

(dipentaerythritol hexaacrylate- and dipentaerythritol
pentaacrylate-crosslinked; crosslinked polymer electrolytes with
high proton cond. and durability and their manuf.)

RN 463963-71-5 HCA
CN Methanone, bis(4-chlorophenyl)-, polymer with (2,5-dichlorophenyl)[4-(4-phenoxyphenoxy)phenyl]methanone and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

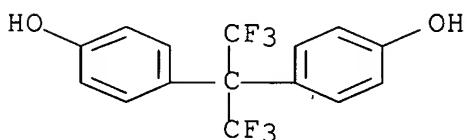
CM 1

CRN 463954-50-9
CMF C25 H16 Cl2 O3



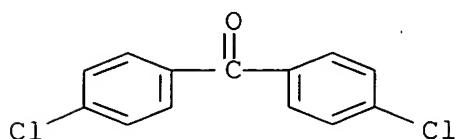
CM 2

CRN 1478-61-1
CMF C15 H10 F6 O2



CM 3

CRN 90-98-2
CMF C13 H8 Cl2 O



IC ICM C08F002-44
ICS C08F283-00; H01B001-06; H01B013-00; H01M008-02; H01M008-10

CC 38-3 (Plastics Fabrication and Uses)

Section cross-reference(s): 52, 76

IT 364062-39-5DP, 4,4'-Dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxybenzophenone copolymer, sulfonated **463963-71-5DP**, Bisphenol AF-4,4'-dichlorobenzophenone-2,5-dichloro-4'-(4-phenoxy)phenoxybenzophenone copolymer, **sulfonated**

(dipentaerythritol hexaacrylate- and dipentaerythritol pentaacrylate-crosslinked; crosslinked polymer electrolytes with high proton cond. and durability and their manuf.)

=>